PERCEPTIONS OF TECHNOLOGY AND TECHNOLOGY EDUCATION IN FIJI AND THE SOLOMON ISLANDS

Implications for a Technology Education Curriculum

A thesis
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by

Alfred Ghere Liligeto
DipEd (Fulton), BEd, MA (USP), MSc (LUT)

The University of Waikato
Te Whare Wānanga o Waikato

Centre for Science and Technology Education Research
Pokapu Rangahau Putaiao te Matauranga Hangarau
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ABSTRACT

This study is about students' and educators' perceptions of technical education, technology, technology education and traditional technology in Fiji and the Solomon Islands. Perceptions are the mental representation of external objects and events based on stimulation from the human organ. People's perceptions can tell us something about their past and present experiences which collectively influence the future.

Previous research work have shown that teachers' perceptions can influence the way they view their subjects and their beliefs about the learning process. These perceptions in turn influence the development and implementation of the curriculum. Students' perceptions are an integral part of the learning process and need to be understood in any curriculum development process. An understanding all these perceptions will assist in developing a curriculum that is better suited to the needs and aspirations of those involved in technology education. In this research the reason for obtaining perceptions was to establish a framework guide for curriculum development in technology education.

This historical origin of the education system in Fiji and the Solomon Islands are important factors influencing both individuals' perceptions of technology education and curriculum development generally. To better understand the influence this study looked at the historical development of the education system from colonial era to date, how technical education became a part of general education and the important role traditional technology plays in people's daily lives. The review revealed that the various churches influenced both the education system from the beginning and the introduction of the technical education into the school system.

This research is interpretive in nature and is both qualitative and quantitative. The method used to collect data was a face-to-face interview. Each interview took approximately 30 minutes and there were 160 participants (60 educators and 100 students) from eight schools. The field research work was conducted at Fiji and the Solomon Islands in 1997 and 1998.

The study revealed that the existing technical education curriculum, when compared with other school curriculum, is viewed as important and useful but in need of improvement and revision. Views on technology vary, but it is generally perceived as an artefact and a recent phenomenon which involves improved efficiency. Technology education was viewed as learning about those aspects seen as technology and, traditional technology was viewed as useful artefacts and knowledge passed down from ancestors. Students' and educators' perceptions of technical education, technology, technology education and traditional technology were similar in many respect but differ in emphasis, level and priority.

This research proposes a new approach to curriculum development as in the past curriculum development has been solely based on the adoption of foreign curriculum. By obtaining students' and educators' perceptions, this research has given students and teachers (educators) an opportunity to voice and raise issues affecting learning and curriculum development. In adopting this new approach hopefully a better technology education curriculum programme can be developed which is relevant and suited to the needs of the people of Fiji, the Solomon Islands and the South Pacific Islands Countries. This study is significant because students' and educators' perceptions will have been considered and incorporated into the curriculum development process.

DEDICATION

This thesis is dedicated to

My wife and children
Rejeli Nakaora Liligeto,
VonErik, SamRoy, KemRaj and Zankruz

My parents
Pastor Kuloburu Liligeto and Damarasi Cinderlyn Tigulu

My sisters
Junia, Junily, Delmay, Darlin and Zina

My brothers
Pastor Wilfred, Wilson and Gilson

My many relatives
Butubutu Babata (Marovo) and Butubutu Laena (Rannogga)

My in-laws
Gagaj Taksas and Kijiana Garagsau.
The Enasio family: Aggie, Fanifau, Tupou, Josephine, Henry, Mue, Penerope, Merewai, Jacob, Fiu Paranata, Susau Antonio and Victor Jione. To Dr Haynes Posala, Rosely, Beverly, Dix Tutuo, Ralph Joseph, Gibson Gomese and David Quan

And to my friends
In Fiji, the Solomon Islands, Papua New Guinea, Australia and New Zealand

The Melanesian wontok reciprocity system and the Rotuman hoisoaga tradition of giving and sharing was demostrated in the numerous contributions towards the completion of this piece of academic work

LEANA VIA and FOIAKSIA

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CHAPTER 1

INTRODUCTION AND OVERVIEW

If the countries of the South Pacific are to achieve their stated objectives of giving all children a well balanced basic education, Industrial Arts, Home Economics, Leisure Education and Elementary Business Studies must be recognized and given their rightful place in the programmes of study. Professor Ian D Stewart, (1975).

1.1 BACKGROUND

A common sight in Marovo Island was the Koku. It is a three poled pyramid structure jutting from the sea, to a height of five metres, off the shore of Ghireghire Island, Marovo Lagoon, Solomon Islands. The front of the structure was facing the deep sea. This was where children and young adults played and frolicked. They took turns climbing to the top and jumping off into the deep sea. The Koku was a simple technological invention, and it was functional as it served a purpose. The Koku can last in the sea for a few months and then it has to be replaced. The technology needed to make the Koku required knowledge, skill and experience as follows: firstly, three straight trees (the main structure) were selected from a nearby forest and cut into poles; secondly, the skill of positioning the poles by tying one end of each pole together and keeping the three poles in place; thirdly, the method of transporting the tied poles into the sea; fourth, the skill of positioning and consolidating the three poles into the sea bed and finally, the placing of other poles (ladders) across the face of the pyramid structure. Prior to this indigenous invention people used to climb tall trees and jump into the sea. However, the construction of the Koku is an example of a refined indigenous technology, developed by the ingenuity of the people of Marovo, Western Province, Solomon Islands, which is still being used today.

Technological innovation has become part of the lifestyle of the people of the South Pacific but nothing is known about their perception of technology. The purpose of this research is to identify both students' perceptions and educators' perceptions of technical education, technology, technology education and traditional technology in Fiji and the Solomon Islands. Exploring these perceptions is important if we are to consider the introduction of a technology education curricula into Fiji and the Solomon Islands educational systems. Technology education is a developing area with major curriculum initiatives in the United Kingdom (McCormick et al, 1993), the United States (Dyrenfurth, 1994), Western Europe (de Vries, 1994), the Nordic Countries (Kananoja, 1994), Central and Eastern Europe (Blandow & Mosna, 1994), Africa (Kerre, 1994), South-East Asia (Wan, 2000), Australia (Morgan, 1994a,b) and New Zealand (Jones, 1995, 1997, 1999). The existing technical education curriculum only provides a very limited view of technology and is structured along gender lines for example, woodwork for boys only and home economics for girls only. This curriculum does not provide adequate opportunities for the development of technological literacy.

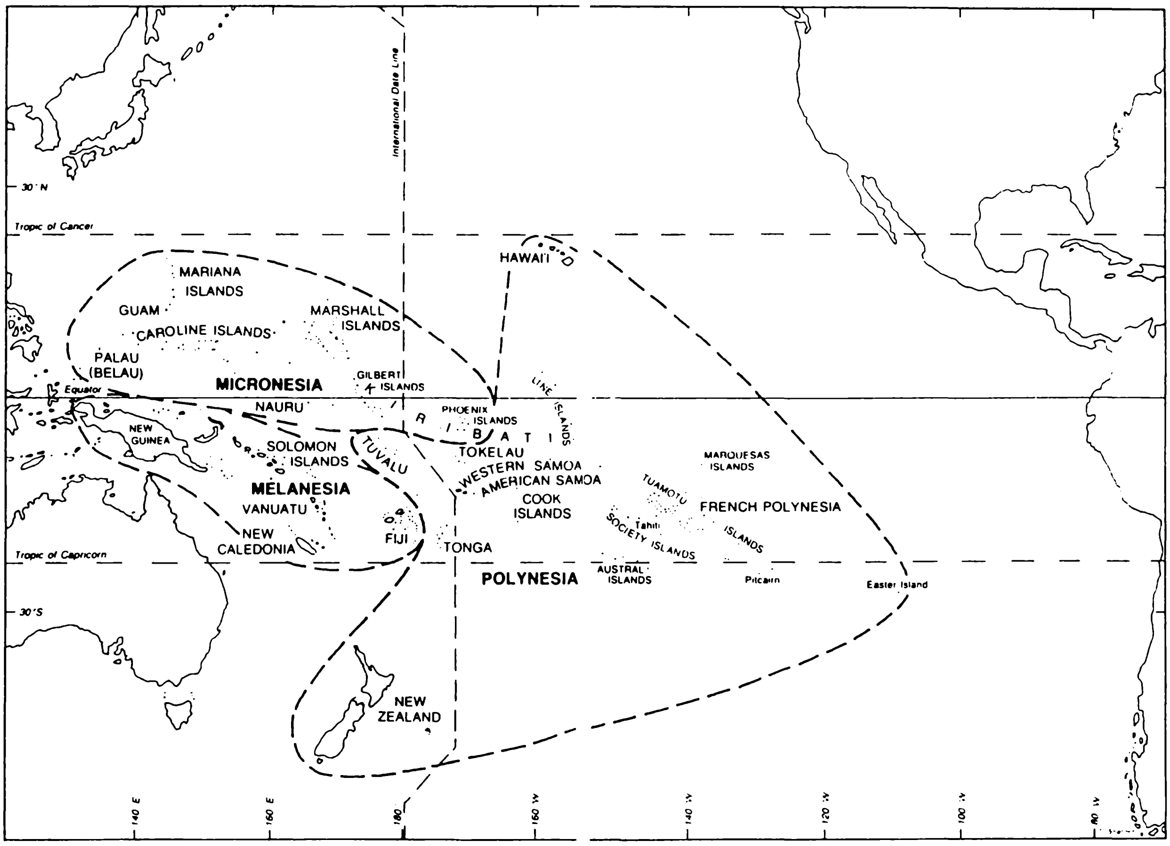
This chapter is divided into six sections and the remainder of this chapter reports on the following:

1.2 The South Pacific Region.
1.3 Rationale of the Study.
1.4 Research Questions.
1.5 The role of the Researcher.
1.6 Thesis Structure and Overview.

1.2 THE SOUTH PACIFIC REGION

As this research focuses on the South Pacific, it is necessary to acquire some understanding and background knowledge about the region. The South Pacific region stretches across the Pacific basin covering Fiji, Solomon Islands, Vanuatu, Tonga, Samoa, Cook Islands, Kiribati, Tuvalu, Niue, Nauru, Tokelau, Papua New Guinea, Tahiti, New Caledonia, Australia and New Zealand. Three ethnic groups occupy this region. Oliver (1989) described them as Melanesians (black island people), Polynesians (many island people) and Micronesians (small island people). They are physically different and culturally diverse. This diversity was also seen in educational development. The colonial experience was also significant. The socio-economic and political influences of the Spainards, Portugese, Germans, Dutch, Japanese, Americans, British, Australians, New Zealanders and the French were enormous. Furthermore, education was influenced by the various churches whose main objectives were religious conversion, thus making the implementation of other education complicated and challenging (Howard, 1970; Kimbell, 1970). The South Pacific Region is constantly undergoing change politically, economically, socially, religiously and educationally, which means that citizens of the South Pacific Countries need to be trained to make sound decisions. The estimated population of the South Pacific is 15 million people (The International Work Group for Indigenous Affairs, 1996).

Figure 1. 1: Map of the South Pacific Islands bordered by Asia on the West, the Americas on the East, the Arctic Circle North and Antarctica in the South (Source: I C Campbell in 'A history of the Pacific Islands,' 1992. pp. 8-9).



- **Education System: Church Influence**

General education in Fiji and the Solomon Islands was influenced by the various churches (Baba, 1984; Fangalasu'u, 1994; Ferch, 1986; Garrett, 1992; Groves, 1939; Knox, 1997; O'Brian, 1995; Searle, 1970; Steley, 1989; Tippett; 1967 and Thornley & Vulaono, 1996). This influence continued from primary, secondary through to tertiary education. Some examples of institutions that have been influenced by the churches include: the South Pacific Regional Seminary (Fiji), the Pacific Adventist University (PNG), the Divine Word University (PNG) (Crocombe & Crocombe, 1994), the Pacific Theological College (Fiji), Solomon Islands Apostolic Centre, Fulton College (Fiji), Kohimarama Theological College (Solomon Islands), Navuso Methodist Agricultural College (Fiji), Corpus Christi College (Fiji), Sonoma Adventist College (PNG) and George Brown College (PNG).

- **Technical Education: A Colonial Legacy**

The current education system is a legacy of the British Colonial Administration and was described by Mathieson and Bernabaum (1991) as the 'British Disease,' because it established an elite class and created division between academic and technical classroom subjects. The existing technical education in high school covers a wide range of subjects including industrial arts (woodwork, metalwork, technical drawing), home economics (food and textile, food and nutrition), agriculture, computer studies, secretarial studies (shorthand, typing) and, business studies (bookkeeping, accounting). Other subjects such as introduction to technology, design and technology (sheet metal, metal fabrication, electronics, glass reinforced plastics) were introduced later. Technical education tends not to be popular with the community (Baba, 1984; Bole, 1975). Parents prefer their children to take academic subjects. Problems faced by technical education include streaming, poor image, lack of support, negative attitudes and gender biased subjects.

- **Common Problems in the South Pacific**

Education progress is hampered by numerous problems (Honan & Harcombe, 1997; Jones & Pinheiro, 1997). These in-turn affect technical education and the possible introduction of technology education. The problems are either human or natural. Scattered islands affect communication and transportation systems. Most isolated islands are only visited once a month by boat. This can create problems with school supplies and also medical supplies. The lack of resources in all forms are limited and this can cause problems for schools. Many schools can not operate properly due to the lack of resources. Lack of management skills are also a problem. The exchange currency rate of most island countries is another problem. Due to the low exchange rates, imported manufactured goods tend to be expensive. Running a school in an outer island with little funding and limited resources is always a problem. Some Melanesian countries are experiencing political instability. This causes economic depression which affects funding for educational development. A sustainable education system needs a stable government. Social patterns and lifestyles of people can be a limiting factor to progress. Indigenous lifestyles have certain advantages for the people like planning together, working together, sharing together and, building together which can be beneficial. Natural resources are bountiful in the South Pacific. However, a lack of local expertise on sustainable logging, mining, and extracting mineral resources is a problem. Obsoleteness and out-dated technology are the result of distance and isolation of remote islands of the South Pacific. The replacement of spare parts for an obsolete machine is often a problem.

1.3 RATIONALE OF THE STUDY

There is an increasing international awareness and emphasis on studies concerning students' and educators' perceptions of technology, and the way these can influence curriculum development and teaching outcomes in the classroom (Jones & Carr, 1992). Little or no research has been undertaken on perceptions of technology in Fiji, the Solomon Islands and the other South Pacific Island Countries. The essence of this research was well summed up by Jones and Carr (1992, p. 238) in a study similar in nature conducted in New Zealand:

> It was apparent from the interviews with teachers that there is a range of views about technology education and these views will influence curriculum development and implementation in the area of technology. An imposed curriculum that does not take account of the existing ideas of teachers, and the realities of the school could be distorted in such a way as to threaten the improved learning that could take place.

Traditionally curriculum development in Fiji, the Solomon Islands and the other South Pacific Countries has been adopted from a foreign curriculum. Soon after political independence, many countries in the South Pacific adopted the curriculum of their former colonizers. Through this, the lifestyle, traditions, culture, perspectives, needs, aspirations of indigenous people, and its relevance to them were not considered. One reason for this approach was the lack of expertise in curriculum development. This has caused dissatisfaction, frustration and imbalance in educational progress. Three examples of past experience include, the 1973 'Education for What?' (Bugotu, 1972) document of the Solomon Islands, the 1985 Education Reform of Papua New Guinea (Tetage, 1995) and the Fiji Islands Education Review Commission 2000. These experiences have indicated that the traditional approach is not working. The same mistakes should not be repeated.

One new approach to curriculum development is through gaining an understanding of the perceptions of the local people. This new method has not been used previously in the South Pacific, therefore this research would be the first research of its kind in the South Pacific region. The logic for choosing this new approach was that prior to any curriculum development, the indigenous way of life needs to be considered. A thorough knowledge and understanding of how people live their lives, view life and what they aspire to, needs to be considered. This will bring an indigenous cultural identity and authenticity to the curriculum. Therefore, the purpose of this research is to identify, collect and understand students' and educators' perceptions on technical education, technology, technology education and traditional technology in Fiji and the Solomon Islands. The reason for identifying teachers' perceptions was that they influence curriculum development through their past experience, the nature of the subject they are teaching, the way it should be taught and their expectations of students' learning (Paechter, 1991). Goodson (1991) further suggested that to understand teacher and curriculum development, a great deal more about teachers needs to be known by examining in detail past influences on the teachers. Curriculum and teacher development needs to grow from these existing conditions (Jones & Carr, 1992). The reason for identifying students' perceptions was their influences on the learning processes. From the results of this research a base, a guideline and a framework for curriculum development could be established. Therefore, this study may be of benefit in the following ways:

- **Policy Makers**

Government policy makers need concrete evidence of what people view as being appropriate education for their citizens. This research will be beneficial in that it will provide the opportunity for students and teachers to voice their opinions on the type of curriculum and features that are needed in the curriculum. The purpose of this research was to obtain these perceptions and to provide government policy makers with a sound basis for future education planning and curriculum development.

- **Curriculum developers**

Curriculum developers need a guideline for the curriculum development process therefore this research will provide that base, which will be beneficial to curriculum developers and help to set future directions. Once this guideline is established, the curriculum developers will use the information to develop the kind of technology education curriculum required. Furthermore, curriculum developers will have the confidence that the curriculum they will be producing will be what the community requires.

- **Educators**

Teachers as educators are a very important part of the education system in the South Pacific because they have an influence over the curriculum development. They understand the needs of the local people and are very much aware of the type of education required. Teachers' perceptions of education and the curriculum development process have been built up through many years of practical teaching. Teachers can also influence the direction and development of the curriculum implementation process (Begg, 1996; Jones & Carr, 1992; Martin-Kniep & Uhrmacher, 1992). Teachers are also familiar with students' perceptions of technology from their interactions with students. With this experience and knowledge of the curriculum, teachers are often at the forefront in voicing their views. This research will give teachers the opportunity to voice and express their disappointments and aspirations concerning the existing technical education curriculum.

- **Students**

Students are often the recipients of the curriculum development process. Traditionally students have played no part in the process of curriculum development. This research will give the students of Fiji and the Solomon Islands the opportunity to voice their opinions and help curriculum development through offering their perceptions. It will be beneficial to students as they will be taught subject contents which will be relevant and appropriate to meet their educational needs.

1.4 RESEARCH QUESTIONS

This study focuses on identifying, collecting, interpreting and understanding students' and educators' perceptions of the existing technical education curriculum, technology, technical education and traditional education in Fiji and the Solomon Islands. This research was conducted to establish a base and a guideline to provide information for the curriculum development process. There are five research questions for this study as follows:

- What are students' perceptions of technical education, technology and traditional technology in Fiji and the Solomon Islands?

- What are educators' perceptions of technical education, technology, technology education and traditional technology in Fiji and the Solomon Islands?

- Does the existing technical education curriculum meet the needs and aspirations of students and educators in Fiji and the Solomon Islands?

- How can the findings of this research inform the curriculum development process in the South Pacific?

- What are the implications of this research for the development of a technology education curriculum in the South Pacific?

1.5 THE ROLE OF THE RESEARCHER

The researcher was central to the outcome of the research as the interpretations of the data will certainly be influenced by the researcher's background, beliefs, concerns, biases and selection. Therefore, there was a need for a statement to be made regarding the researcher's involvement in this study. Qualitative and quantitative research cannot be made entirely objectively and researcher-proof since the researcher's subjectivity cannot be ignored (Evening, 1998). This section will provide relevant personal background information which may have had an influence on the interpretation of the data of this study.

As an introduction to this section and as the researcher is an educator of technical education, two major concerns need to be addressed. Firstly, the history of technical education in the South Pacific has not been very satisfactory due to the community's negative perceptions of technical education, which will continue if no change is made (Baba, 1984; Bole, 1975). Secondly, there is a need for a better technical education programme to replace the existing one (Baba, 1984 & 1986; Maetia Report, 1996). In essence, it is necessary for technology education to become a subject in its own right within the school curriculum (Baba, 1986; Black, 1994; Baumgart & Fry, 1994; Jones, 1999; Layton, 1993, 2000; Lewis, 1991; Lewis, 1995; McCormick, 1993a, b, c). It is also important for technical education graduates to be accepted within their own society.

The researcher was born in the Solomon Islands, grew up in Papua New Guinea and now resides in Fiji. All these island countries are known as the Melanesian group and are located in the South Pacific Region. This identifies the researcher as a Melanesian who would therefore would be regarded as an insider and an indigenous researcher. This local ethnic status and identity was an advantage to the researcher because the participants of Fiji and the Solomon Islands felt at ease with the researcher as they were from the same ethnic island group and from the same region. Furthermore, the researcher's knowledge and understanding of the people, the language, the culture, the countries and the region was also an advantage during the collection and interpretation of the interview data. The researcher was educated in the primary school, secondary school, and tertiary institutions in the Solomon Islands, Papua New Guinea, Fiji, Australia and the United Kingdom. The researcher has also taught technical education subjects in secondary schools in the Solomon Islands and in Fiji, and has been involved in the training of technical education teachers for secondary schools throughout the region. This local identity, knowledge and experience both as a local student and a technical education teacher/lecturer, provided the researcher with a local perspective and the insight which is central to this study.

This research was also driven by the view that an understanding of these perceptions would be able to form the basis for the development of a broad-based technology education curriculum. The decision lies entirely with the students and educators as they are the recipients of education development and curriculum implementation. By listening to the students' and educators' complaints, disappointments, aspirations, experiences and suggestions, a framework for the development of a broad-based technology education curriculum can be established for the high schools of the South Pacific Island Countries.

1.6 THESIS STRUCTURE AND OVERVIEW

This section will outline the general structure of the remaining chapters of this thesis by providing a summary of each chapter.

Chapter 2 discusses the existing technical education curriculum in high schools in Fiji and the Solomon Islands. It gives a general description of the two countries and highlights the influences that the various churches have had on the education system.

Chapter 3, examines technology and technology education. It provides a literature review of technology and technology education and highlights the technology education curriculum as an emerging distinct, independant, separate, classroom subject. The international trends in technology education are also highlighted showing experiences from the United Kingdom, the United States, the Nordic Countries, Eastern Europe, Western Europe, South America, South-East Asia, Australia and New Zealand.

Chapter 4 covers the topic of perceptions and curriculum. A literature review on the perceptions of students' and teachers' on technology in Europe, the UK, USA, South-East Asia, Australia and New Zealand are highlighted. This chapter also draws a comparison of the different curriculum types internationally, and the development of classroom curriculum, school curriculum and domestic curriculum within the framework of the national curriculum.

Chapter 5 presents the research methodology. This chapter describes the history of this research and how it was conducted from the planning stage to the completion stage. This chapter describes the following aspects used in this research including interpretive, qualitative and quantitative methods, the types of data collected, the analysis process, ethical considerations and problems and limitations.

Chapter 6, focuses on Fijian students' perceptions of technology. Chapter 7, covers the topic of educators' perceptions on technical education, technology, technology education and traditional technology in Fiji. Chapter 8, describes students' perceptions of technical education, technology and traditional technology in the Solomon Islands. Chapter 9 explains educators' perceptions of technical education, technology, technology education and traditional education in the Solomon Islands.

Chapter 10 presents a discussion, conclusions and implications of the research findings. It provides a summary of findings of the previous four chapters (6, 7, 8 & 9). This chapter also discusses and compares the findings of the research work with literature relating to perceptions, perceptions and curriculum.

The next chapter will discuss the existing technical education curriculum in both Fiji and the Solomon Islands.

CHAPTER 2

EXISTING TECHNICAL EDUCATION IN FIJI AND THE SOLOMON ISLANDS

We have a well established tradition of technical education in schools ...
Dr Tupeni L Baba, (1986).

2.1 INTRODUCTION

The previous chapter gave an overview of the research conducted. This chapter focuses on the existing technical education curriculum in both Fiji and the Solomon Islands. This chapter provides the necessary background information on the existing technical education curriculum, and highlights the important role that the churches have played in the development of education in both Fiji and the Solomon Islands.

The existing technical education curriculum was a colonial legacy and is typically regarded as unnecessary or of limited value to most students. This marginal status is reflected in poor enrolments and in outdated and limited resources available for students. This has caused concern to educators of the South Pacific. This concern explains the relatively low level of technological literacy in their students and in the wider community as highlighted by educators and administrators such as Baba (1984, 1986), Basha (1981), Bole (1975), Bugotu (1972), Douglass (1972), Greaves (1972), Griffiths (1975), Ki'i (1994), Lewis-Jones (1956), Maetia (1996), Mayhew (1938), Stephens (1946), Stewarts (1975), Thaman (1985) Treadaway (1996) and Tukunia (1975).

This chapter is divided into four sections and the remainder of this chapter reports on:

2.2 The Fiji Islands.

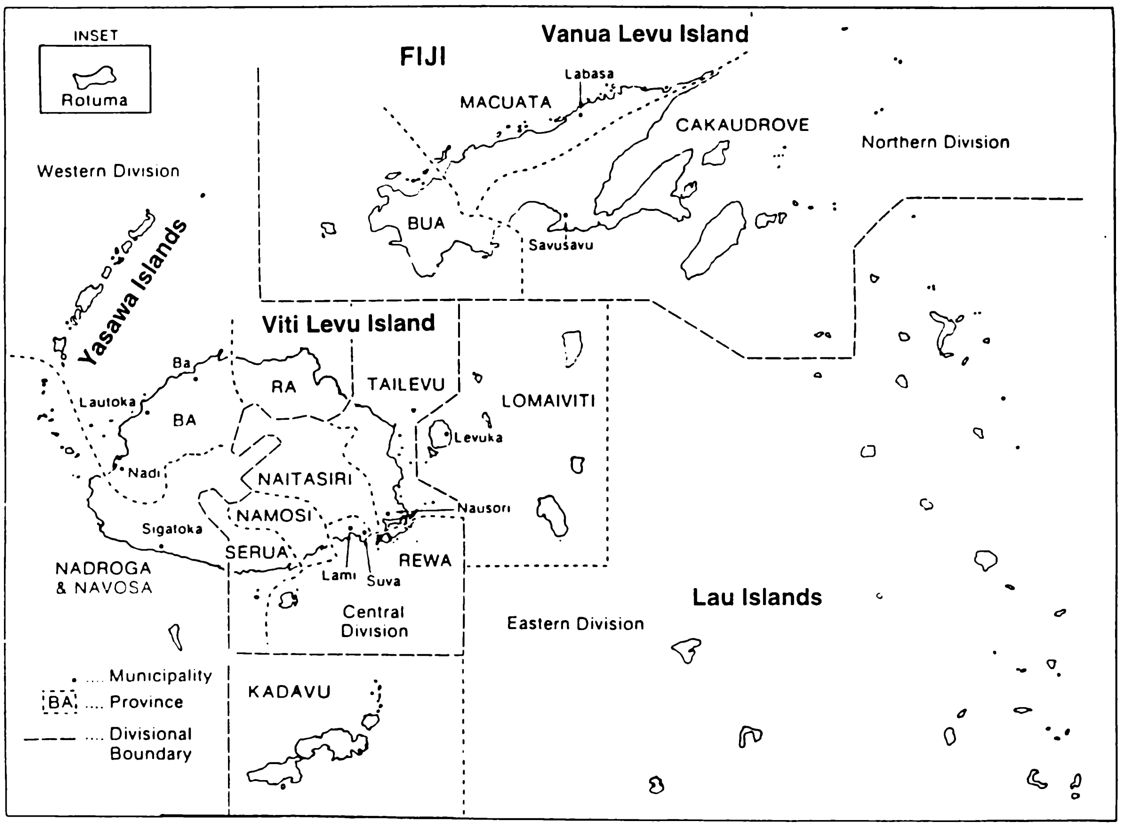
2.3 The Solomon Islands.

2.4 Summary.

2.2 THE FIJI ISLANDS

As this study is focused on the existing technical education curriculum in Fiji, it is necessary to have a general understanding of the country. This section will discuss Fiji and the development of its curriculum.

Figure 2.1: Map of Fiji Islands. (Source: Tavola in 'Secondary Education in Fiji,' Institute of Pacific Studies, The University of the South Pacific, 1991, p. 159)



- **Background**

Fiji is an archipelago in the south-west Pacific, with 320 islands of which one-third are inhabited (Jones & Pinheiro:1997). It is of volcanic origin, has a tropical climate and is prone to cyclones (Tavola, 1991). Fiji consists of two main islands Viti Levu and Vanua Levu. They are surrounded by the Yasawa Islands in the west, the Lau Islands in the east and Rotuma Island to the north-west. Suva, is the capital city and Nadi International Airport is the gateway providing an international link. The Fijian economy is agro-based also supported by tourism, and sugar is the main export product. Fiji is the centre for learning for the South Pacific Island Countries. As a nation, Fiji has developed into a relatively progressive nation.

History

The first people to settle in Fiji were the Lapita people about 1,500 BC (Jones & Pinheiro, 1997). Tongans and Samoans influenced eastern Fiji 1000 years ago. Abel Tasman visited Fiji in 1643 and Captain Cook came in contact with Fijian people while exploring Tonga. Early Europeans were lured to Fiji by Sandalwood and Beche-de-mer (sea cucumber) trade in the 19th century while a Tongan link was established in the Lau group by Ma'afu. Fiji was ceded to Great Britain in October 10, 1874 and gained independence on October 10, 1970. Since independence, Fiji has played an important role as spokesperson for the South Pacific countries internationally.

People

Indigenous Fijians are called Taukei (O'Sullivan, 1992). An anthropologist described the Fijians as 'culturally Polynesians but physically Melanesians' (Nayacakalou, 1978). The descendents of the indentured Indian labourers, (the girmitiyas) are called Indo-Fijian or Kaihidi (Lal, 1983). The Europeans are called Kaivalangi, the Part-Europeans are called Kailoma and the visitors are called Vulagi (Ravuvu, 1991). The Chinese, Banabans and other Pacific Islanders are called Others. The 1997 constitution classifies every citizen as Fiji Islanders (Fiji Act 1997). The population of Fiji in 1994 was estimated to be 784,000 (Forum, 1996)

Culture

Historically Fiji is a multi-cultural and a multiracial society. Howard (1970, p. 9) said "culture is the product of history, and cultural transmission is itself an historical process." Fiji has a blend of cultural identities of diverse ethnic groups from Melanesians, Polynesians, Micronesians, Indians, Europeans, Chinese and Pacific Islanders. This multicultural society is reflected in the lifestyles, the songs, the dress, religions, the variety of dishes, the festivals and in the shades of skin colour. The Fijian culture is very much intact but like any other culture is continuously changing to accommodate change (Lasaqa, 1984; Ravuvu, 1983; Roth, 1953). Despite the strong influences of western values, indigenous Fijian culture still remains strong.

Language

There are approximately 300 dialects in the Fijian language (Jones & Pinheiro, 1997). The standard dialect for Fiji today is the Bauan language (Vosa Vakabau). It is used throughout the country, in schools, in radio programmes and in traditional ceremonies. Indians speak Fiji Hindi (Hindustani) versions of India's Urdu language.

Most rural Fijian citizens speak both Bauan and Hindi. Other minority ethnic groups are allowed to speak their own language. The English language is the official language spoken throughout the country in the commercial sector, government, schools, the neighbouring regional countries and for international links.

Religion

Fijians are religious people and their religion is based on ancestral spirit worship. Hoa'ga, Atua (Eason, 1951); Dakuwaqa, Degei Ligadua, Ravovonica-Kaugawa, Raivuki, Rakavono and Rasikilau were some indigenous gods (Reed & Hames, 1967). Christianity was introduced by the missionaries through mission schools. Religion is extremely influential in all aspects of Fijian society, affecting politics, government, education, and interactions within and between different races. Statistics show that 52.9% are Christians, 38.1% are Hindus, 7.8% are Muslims, 0.7% are Sikhs and 0.1% belong to other religions. It is believed that only 0.4% have no religion (Jones & Pinheiro, 1997).

Government

The basic unit of Fijian administration is the village (koro), headed by a hereditary chief (turanga-ni-koro) who is appointed by the village elders (Lasaqa, 1984; Ravuvu, 1983; Toren, 1990). Several villages (koro) are linked as districts (tikina), and several districts (tikina) form a province (yasana). Fiji is divided into 14 provinces and each has a high chief who together form the Great Council of Chiefs which is very influential in decision-making at the local and national level. The government system followed the British Westminister System and the American Presidential System. The Fiji parliament consists of a Senate (Upper House) and a House of Representatives (Lower House). The Prime Minister and President are both elected and serve for a five year term.

Economy

Sandalwood, Beach-de-mer and whaling trading were the attractions which brought traders at the turn of the century. Tourism and sugar account for a large share of the economy (Jones & Pinheiro, 1997). Fiji also exports molasses, gold, timber, fish, copra, coconut oil and clothing. Recent diversification of export goods include forest wood chips, sawn timber and the manufacturing of leather and furniture. Problems hampering economic growth include poverty, business inequality, unemployment, a contradiction of traditional values versus the modern money economy, government policy, little Fijian participation in business and the migration of professional people.

Former Prime Minister Mahendra Chaudhry's (1999, Fijilive.com) policy was for more Fijian participation in business. He said:

> The high failure rate of indigenous business enterprises is another area of great concern ... I believe we need to reassess the approach we have taken so far into integrating our Fijian and Rotuman enterpreneur into the commercial life of our nation. I think the mistake we have made is to pour millions of dollars into projects without providing necessary training and management support and guidance.

Workforce

The workforce is estimated at 275,000 of whom 33% are classified as being self-employed workers while 36% are in formal paid employment (Forum, 1996). Nearly 80% of the workforce have been educated to secondary school level and only 4% have continued through to tertiary training at an academic or specialist skills level.

General Problems

Fiji's main problems have to do with the unequal distribution economically and the educational progress of the two main ethnic groups. These issues have caused an unease in race relations. Common problems include remoteness and isolation of the outer islands, which affect communication and transportation, neglect of rural areas (past development mainly concentrated on urban areas), accessibility to the rural areas (rural areas in the past were denied the benefits of development), unequal distribution of development and the problems of youth and unemployment.

- **The Education System**

There have been several education policy documents, that have influenced the direction of education in Fiji, since the Colonial Era. These have included:

1 Colony Education Policy Paper (1896)
2 Government Ordinance (1916)
3 Fiji Education Commission (1969)
4 Education Act - Laws of Fiji, Chapter 262: Education (1978)
5 Education Fiji 2020, Draft (1998)
6 Fiji Islands Education Review Commission 2000 (1999).

Traditional Education

Traditional education in Fiji has evolved over hundreds of years and continues to do so today. It has become a part of the Fijian way of life (Vakaviti cited in Bakalevu, 1998). The unwritten indigenous curricular includes: Fijian protocol, traditional ceremonies methods of weaving, fishing, hunting, warfare and combat skills, arts and crafts, the building of houses (bures) and the ocean-going canoes (the druas). Traditional education is determined by one's status within the society and this consists of six levels namely: slaves, commoners, warriors, lesser chiefs, big chiefs, kings and queens (Derrick, 1957; Scarr, 1984). Throughout the span of an individual's life-time, oral tradition and all relevant skills are learnt and practiced daily.

Church Education

The education system has been influenced by churches since colonisation (Baba, 1984; Garrett, 1992; Tavola, 1991; Thornley & Vulaono, 1995). Kimball (1970, p. viii) described missionary education in Fiji and Rotuma in the following manner:

> Missionary education, under the guise of bringing "pagan" natives to a worship of the true God and of civilizing their manners and morals was, in its initial phases, an arrogant and insensitive imperialism, however kindly and well-intentioned the purveyors of Western ways may have been.

The two churches with the most influence were the Methodists and the Catholics. Evidence of this can still be seen today by the number of church owned and church run schools in Fiji. The Methodists and the Catholics practised two different education philosophies which are reflected in their style of educating. The Methodists used religious materials to provide basic reading and writing education. They also introduced practical-oriented school subjects such as agriculture, carpentry, typing, home craft and commerce. The Methodists used the Fijian language more efficiently as a medium of learning while the Catholics used the English language as a vehicle for the learning process. The Catholic schools, on the other hand, are more centralised, more intensive and have a more academic orientation in their approach (Tavola, 1991). The Methodist Church today owns 16 primary schools; 12 secondary schools and two vocational schools (Uluicicia, 1998). By 1868 the Marist Catholics were able to establish five mission schools in Fiji, however currently there are numerous Catholic schools in Fiji. The Anglican Church, the Seventh-day Adventist Church and the Assembly of God also established schools of a similar nature. According to Howard (1970) the missionaries also brought with them new resources, new ideas and new problems.

Colonial Education

For the first 30 years of colonial rule (beginning 1874), the colonial government did not educate Fijian students, as this was undertaken by the churches (Tavola, 1991).

However, there were government run schools which provided education for European children in the town of Levuka (from 1879) and Suva (from 1883). Queen Victoria School was established in 1906 to educate the children of the chiefs. By 1930, six provincial schools were established by the provincial councils offering practical-oriented courses. In 1955, these schools were amalgamated into what is now known as Ratu Kadavu Levu School. The first schools for the Indian population were established in 1898, by the Methodist Mission and the Marist Brothers. Later the Anglican Church, the Arya Samaj and the Muslim League also established schools for Indians.

Post Independence Education

After independence in 1970, no radical changes took place in the education system. The Royal Commission of 1969, became the basis for future educational planning and recommended several Development Plans (Cakanasiga, 1982; Lasaqa, 1984; Mangubai, 1984 and Tavola, 1991). Development Plan VI, (1971-1975) focused on teacher education and teacher training. Development Plan VII, (1976-1980) focused on quality education and had a strong emphasis on vocational education to cater for school leavers. Development Plan VIII, (1981-1985) focused on relevancy, the usefulness of the curriculum, revision of the curriculum, the introduction of new practical subjects, revision of teacher education and the introduction of agro-technical courses. Development Plan IX, (1986-1990) noted that there was little progress being made in technical and vocational education (Tavola, 1991).

Formal Education

Formal education was introduced by the mission schools. It was the 1969 Royal Commission which recommended a change in the school structure (from the 8 year primary/4 year secondary system (8:4) to 6 year primary/4 year junior secondary/2 year senior secondary system (6:4:2)). The Royal Commission also recommended the following: schools to be established in rural areas, more practical oriented subjects, more assistance for Fijian education, the establishment of pre-school and special education. There were 29 Controlling Authorities responsible for running schools. Currently the government owns 16 schools, the churches run 125 schools, Hindus run 63 Schools, Muslims run 32 schools, Gujuratis run eight schools, the Chinese community runs two schools, various community based committees sponsored 600 schools, special education 14 schools, the statutory bodies seven schools, five private schools and the government has 36 vocational centres throughout the country (Ministry of Education and Technology Annual Report for the Year 1997, 1998).

- **Existing Technical Education**

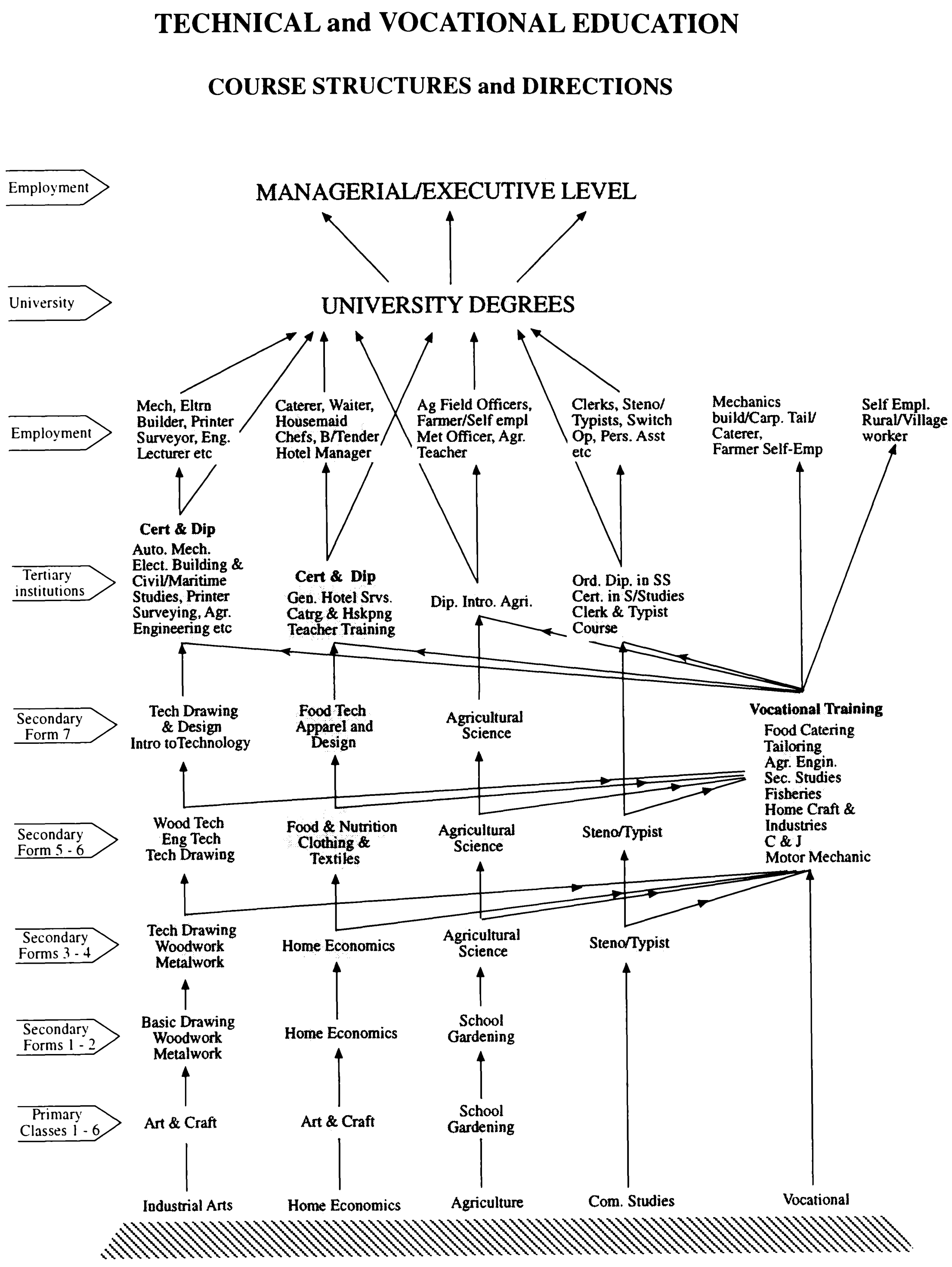
The first manual training programme in Fiji was established at Viwa Mission, run by the Methodist Church (Thornley & Vulaono, 1995). Technical education was introduced by the educator Mr R. A. Derrick (Tukunia, 1975) at Davuilevu. Students were taught woodwork, technical drawing and carpentry. After three years, some graduates were given jobs with the Public Works Department (PWD). Others went on to Nasinu Teachers College (NTC). In 1949, the first graduates went to Suva Craft Centre to be trained as manual arts teachers. Courses included woodwork, building, light engineering, agriculture, commerce and home economics. From this humble beginning, technical education developed to become part of general education in Fiji. The existing technical education programme in Fiji as illustrated in Figure 2.2 (p. 19), is called Technical & Vocational Education and Training (TVET). In the past, it has been called other names such as craft education, multi-craft, industrial education and technical education. The core subjects for TVET (as shown in Figure 2.2) include industrial arts, home economics, agriculture, commercial studies and vocational studies. The objective of the TVET programme as reported by the Ministry of Education and Technology Annual Report for the Year 1997 (p. 19) was to:

> Provide and improve the quality and delivery of the technical and vocational education and training programmes in primary, secondary and vocational institutions for the enhancement of student's opportunities for social and economic well being.

The examinable subjects for TVET offered at high school (F4, F6 and F7) included: agricultural science, home economics, clothing and textiles, food and nutrition, introduction to technology, food technology, apparel and design, technical drawing and design, wood technology, engineering technology, computer education, secretarial studies, office practice and shorthand (Ministry of Education, 1999).

The TVET subjects offered at primary school are: basic needlecraft, basic agriculture, integrated technology and basic foods preparation. The vocational TVET technical subjects (established under the 1978 Education Act) included: automotive engineering, carpentry and joinery, computer studies, food catering, tailoring and entrepreneurship training (Sharma, 1989 & 1995). The main objectives of school-based vocational education and training were: training for paid employment, training for further education, training for self employment and training for acquisition of life skills relevant to village or rural life.

Figure 2.2: Technical & Vocational Education and Training (TVET) Structure and Directions. (Source: Ministry of Education and Technology, Fiji. Publication date not recorded). Up-dated November 2001.



Training and Career

The opportunity to secure scholarships and training for technical education was limited. However, the Ministry of Education reported the following in 1997: 60 technical teachers were on scholarships at Fiji Institute of Technology, 1572 students were enrolled at various vocational training centres, 766 vocational students graduated, eight schools were implementing pilot projects for the new Form 7 Computer Studies and 18 new computer centres were approved to offer computing (Ministry of Education Education Annual Report 1997, 1998). The job market for technical graduates was also limited as this area was highly competitive. A job that was advertised, normally received many applicants as the market is saturated except in very specialized areas. The existence of several institutions, that were all turning out graduates with similar qualifications caused this problem. The institutions included Fiji Institute of Technology, the Fiji National Training Council, the Department of Engineering at the University of the South Pacific, the Fiji College of Advanced Education and the Telecommunication Training Centre.

Streaming of technical education subjects

Streaming of subjects was done by dividing classroom subjects into either academic or technical subjects and was gender based. The streaming of subjects was in many ways a hindrance to students choices and progress. This streaming process led to the discouragement of students of either gender to enroll in subjects of interest. For example, a girl might be interested in learning technical drawing or industrial arts but she may refrain from choosing it because of the tradition. The streaming process also often predetermined students future careers. Many students missed out on the subject of their choice due to this streaming process. Three types of schools existed in Fiji which encouraged streaming namely: schools exclusively for boys, schools only for girls and co-educational schools (Evening, 1998). Technical schools in Fiji suffered because of the streaming practices.

Facilities and Equipment

Technical education programmes in Fiji often lacked facilities due to a lack of funding, funding from the Ministry of Education. Given this scenario most technical education teachers look for alternative ways to raise money to buy equipment and materials. However, in a rich school, technical teachers do enjoy the support given by the school administration and have a stronger sense of belonging within the school. Many schools have adequate facilities and support from their principals but up-grading and maintenance often pose a problem.

General attitude towards the technical education curriculum

Technical education in Fiji was not seen as important. Baba (1984, p. 7) described this attitude towards technical education as biased ever since its introduction. He expressed it in this statement:

> When technical education was introduced, it did not receive the same status and emphasis as academic. In time, it became "academic" in orientation through its inclusion as an examinable subject in external examinations and thereby received greater respectability. In cases where this did not happen, such subjects or courses and others like them were earmarked for those who were considered not "bright" academically.

Prejudice towards technical education also existed in schools. There seemed to be an effort to avoid technical education in the school system (Bole, 1975). Past experiences have shown that parents preferred their children to enroll in academic subjects and not in technical subjects. They viewed technical education as not financially rewarding. To be a doctor, a teacher, a nurse and an architect were perceived as the ideal professions. Administrators also gave little support to technical subjects and training. Prejudice can also be observed in the actual physical location of the mostly dilapidated buildings used for technical subjects.

Support for technical education

The Ministry of Education and Technology was supportive of the technical education programme. Evidence of the support given by the Ministry of Education and Technology can be seen in their official title, in the mission statement and the technical division created within the Ministry of Education based at Quality House, Suva. However, financial constraints were often a hindrance to progress as a lot of money was required to set up proper technical education programmes.

- **Indigenous Technology**

Indigenous technologies are a part of the Fijian way of life (Vakaviti, cited in Bakalevu, 1998). Indigenous technology include the techniques, methods, skills, knowledge and tools developed by ancestors through trial and error for survival. These were perfected and handed down to the next generation. Learning was through participation but certain families were gifted in specialized areas. Indigenous technologies are part of the Fijian culture but they slowly changed over time (Ravuvu, 1983). Indigenous technology maybe viewed as outdated. However, they form a bridge from the past to the present, and the present to the future. Some reasons for keeping indigenous technology alive include: (a) enhancing cultural identity, (b) to practice Fijian Living Skills, (c) the preservation of knowledge, (d) to bridge existing technical education, (e) communicating the Fijian way of life, (f) establishing a base to build modern Fiji and (g) forming a springboard for technology education programmes.

Indigenous Fijian technology represents the living aspects of the Fijian way of life in their arts, crafts, artifacts, methods and techniques of gathering, hunting, storing, cooking, games played, building, weaving, practices of herbal medicine and societal protocols. These aspects form the basis of the Fijian way of life (Vakaviti) and every Fijian is expected to know these indigenous technologies. Indigenous technologies are highly valued and respected, and they are an integral part of the traditional Fijian way of life (Vakaviti). Specialization and abilities to perform are associated with mana and power. Those who perform skills are also aware of their position within society and respect the skill and ability they possess. Value and respect for indigenous technology were learnt through participation.

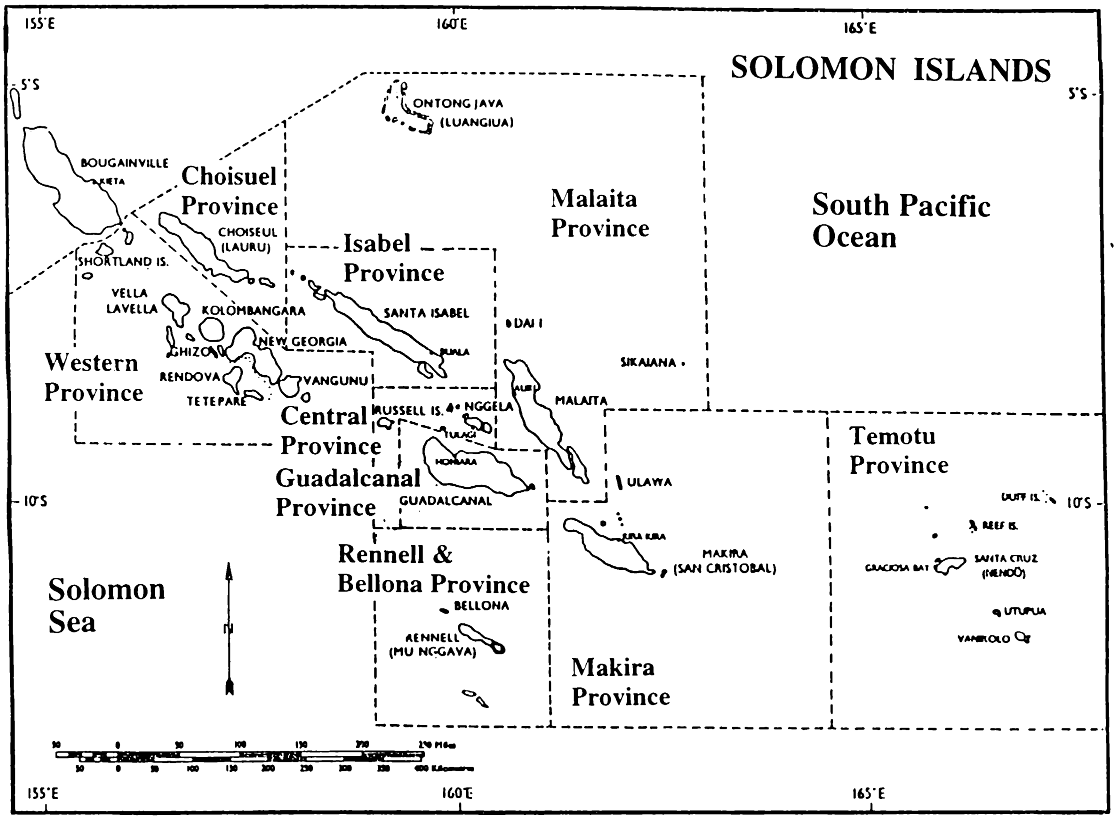
Indigenous technology is a way of life for Fijians and Rotumans. Their lifestyle revolves around indigenous technological activities, as their whole day's work involves technological activities. The land and the sea hold the key to their daily survival, but to be able to live each day they have to be innovative and creative. It was through their quest for survival, that indigenous technologies were developed, by people studying their surroundings and the environment. These indigenous technologies were refined over time. Indigenous technology in Fiji may be divided into three main areas. Those technologies relating to land, those relating to the sea and those relating to the sky. For example firstly, those relating to land included (qele), technologies such as gathering, hunting, farming, building, cooking, weaving, tools, equipment, weapon and ware-fare; secondly, those relating to water included (waitu and uciwai), technologies such as fishing, netting, diving, spearing, sailing, surfing, swimming, gears and materials and finally, those relating to sky included (lomalagi), technologies involving skills associated with the design of flying objects, techniques of climbing, navigational aid by reading the stars and weather forecasting by observing weather pattern. See list of Fijian technologies in Appendix A, Table 4.

The first section of this chapter described the Fiji Islands. The next section of this chapter covers the Solomon Islands.

2.3 THE SOLOMON ISLANDS

Since the study is focused on existing technical education in the Solomon Islands, an understanding of the country and the development of its education system is necessary.

Figure 2. 3 : Map of Solomon Islands. (Source: Lands Department, Honiara. 1995)



- **Background**

The Solomon Islands is the third largest archipeligo in the South Pacific. It has a total land area of 28,000 sq.km (McCoy, 1999) with 992 islands of which 347 are inhabited. There are six large islands of Guadalcanal, Malaita, New Georgia, Santa Isabel, San Cristobal and Choisuel. It is rich in natural resources and has one of the best tuna fishing grounds in the world (ADB Report, 1998). The climate is influenced by the surrounding sea. Cyclones, earthquakes and tsunami are relatively common. Its geographical location poses economic hardship (Kent, 1972). Honiara is the capital city with a population of 70,000 (ADB Report, 1998). The Solomon Islands population is 441, 000 (Lycos.com, 2001). The majority of the people still live in villages and are still clinging to their traditional way of life. The Solomon Islands is known as the happy isles but recently (1998 to 2000) it has been torn apart by ethnic tension.

History

The Solomon Islands was first settled by people from South-East Asia. Lapita people appeared between 2000 and 1600 BC. In 1568, Captain Alvaro de Mendana called the new islands Yslas de Salomon (Jack-Hinton, 1969) and by 1570, the name Solomon Islands was used. During the Great Peace period, whalers, sandal wood and beche-de-mer traders visited the country. In the 1860s during the Blackbirding period, 29,000 Solomon Islanders were taken to work on sugarcane plantations in both Queensland and Fiji. It became a British protectorate in 1899 and named the British Solomon Islands Protectorate (BSIP). In 1927, the Kwaio Rebellion (Kessing & Corris, 1980) and the Ma'asina Ruru Movement (Bennett, 1987; Keesing, 1992; Laracy, 1983; Stevenson, 1988) made history which influenced the future destination of the country. In 1945, the capital was moved from Tulagi to Honiara. The 1950s, were years of recovery and educational institutions were established. The 1960s were the years of political awakening, leading to the creation of an elected Governing Council in 1970. The British Solomon Islands Protectorate was renamed the Solomon Islands and gained political independence on July 7, 1978 (Saemala, 1979). The pre-independence and post-independence times caused years of frustration, because the education system did not meet the needs of the people. The education system was said to be too academic, not practical and did not provide appropriate life-skills for the people. The government reports known as Education for What? (Bugotu, 1972) and Education for Who? (SINURP, 1994) were undertaken to address these issues. The provincial government system was established in the 1980s, to decentralise power which has had the effect of spreading education to the rural people. The 1990s was characterised by power-struggle of the various political parties namely: People Progressive Party (PPP), People Alliance Party (PAP), Labour Party (LP) and Solomon Islands Action for Change Party (SIAC). The December 5, 2001 General Election began a new chapter in Solomon Islands' political history after three years of ethnic tension.

People

Solomon Islanders are made up of several ethnic groups, consisting of 380,000 Melanesians (92%), 15,000 Polynesians (4%), 4,500 Micronesians (2%), others (2%) including Asians, resident expatriates Europeans and other Pacific Islanders. Of a population of 441,000 (Lycos.com, 2001) only 14% live in urban towns while 86% live in the rural areas and still practice self-supportive agriculture, hunting and fishing (McCoy, 1999). Every individual born in the country or naturalised is considered to be a Solomon Islands citizen.

Customs (Kastoms/Kastomu)

Kastom is considered to be the Solomon Island way of life (Elbert & Monberg, 1965; Hviding, 1992, 1995ab, 1996; Keesing, 1992; Monberg, 1966; Walter, 1930). Kastom is the culture, beliefs, rituals, religion, protocols, ceremonies, the big man system (a person with traditional material wealth) (Keesing, 1978), the wontok system (members of the same clan taking care of each other), egalitarianism, patrilinealism and matrilinealism. Kastom is diverse with each community practicing a distinctive way of life. The big man system operates on the basis of status, power and wealth whereas the wontok system works on a reciprocity basis. Traditional kastom is still the way of life (Burt, 1997).

Language

The Solomon Islands is a multicultural nation (Hviding, 1992, 1995ab, 1996). It has 70 listed indigenous languages and 30 dialects (Honan & Harcombe, 1997; Laracy, 1989; Macneill, 2000). English is the official language and is used in business, government and schools. Pidgin Iglis is the lingua franca and commonly spoken throughout the country. It is a common language to break kastoms and language barriers. A unique feature in the Solomon Islands is that more than one language is spoken within an island and between villages on the same island.

Religion

Solomon Islanders are very religious people (Burt, 1994). They worship the spirits of their ancestors (Bennett, 1987) and most practice Christianity. Today 90% of the population are Christians. The five main churches are the Church of Melanesia (35%), the Roman Catholic Church (20%), the South Seas Evangelical Church (18%), the Uniting Church (11%) and the Seventh-day Adventists Church (10%). Recent arrivals include Jehovah Witness, the Bahai, the Assemblies of God, the Church of the Latter Day Saints and the Pentecostals. The Solomon Islands Christian Association (SICA) represents all Christian religions in the Solomon Islands.

Government

The Solomon Islands adopted the parliamentary democratic system of government. The Queen of England is Head of State and she is represented by a Governor General. There were 50 members of parliament, headed by a prime minister, and also including cabinet ministers. The Prime Minister serves a term of four years. There are 10 provinces with a certain degree of autonomy (See Solomon Island map, p. 23). Each province has a premier and a cabinet of provincial members elected every four years.

The capital city of the country and the seat of the national parliament is located in Honiara on the island of Guadalcanal.

Economy

The economy of the Solomon Islands depends on natural resources. About 30% of land is under agricultural cultivation. Mining prospects are bright with gold, nickel, bauxite and phosphate deposits (ADB Report, 1998). The manufacturing industry includes boat-building, palm oil milling, timber and fish processing, while products made include paint, furniture, fibreglass canoes, water tanks, custom shell jewellery, buttons, biscuits, soft drinks, beer, clothing, soap, nails, coarse tobacco, and baking bread. Currently the tourism is small. Exports include timber (49%), fish (25%), palm oil (13%), copra (6%) and cocoa (2%). Imports include heavy machinery, transport equipment, foodstuffs, mineral fuels, chemicals and clothing (Honan & Harcombe, 1997).

Workforce

A key characteristic of Solomon Islands employment is that the majority of people 85% (World Bank, 1993) are economically inactive which means that they do village work for no money. In 1995, there were 34,200 people in full time or part-time employment. The country's income per capita is SI$134 per year. The greatest employer is the government. The majority of employees are classified as labourers receiving a minimal wage of SI$2.00 an hour. A very small number are classified as skilled. There is an increasing number of Solomon Islanders in professional careers such as managers, pilots, doctors, engineers, teachers, police, bankers, entrepreneurs and technologists.

Problems and Difficulties

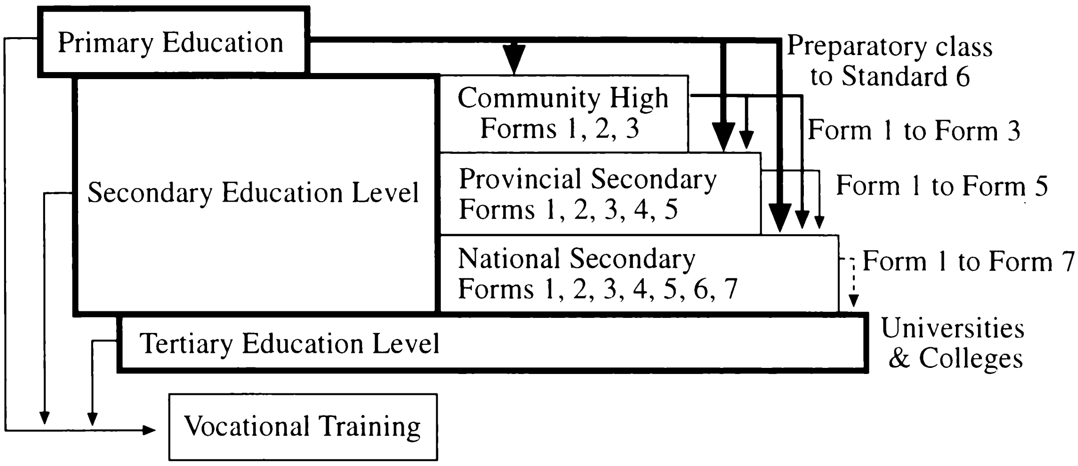
The Solomon Islands share problems from both the Pacific region and other third world countries. Western culture has also influenced the social structure of the islands causing urban drift, which has resulted in socio-economic problems. It has given rise to lifestyle diseases such as diabetes (ADB Report, 1998) and a literacy rate of 62%, one of the lowest in the South Pacific. Reaching out to the rural areas is also a challenge. Geographically, the Solomon Islands are vulnerable to natural disasters due to being part of the South Pacific which is on the earthquake rim and the cyclone belt.

- **The Education System**

The Education System of the Solomon Islands was influenced by the British Colonial

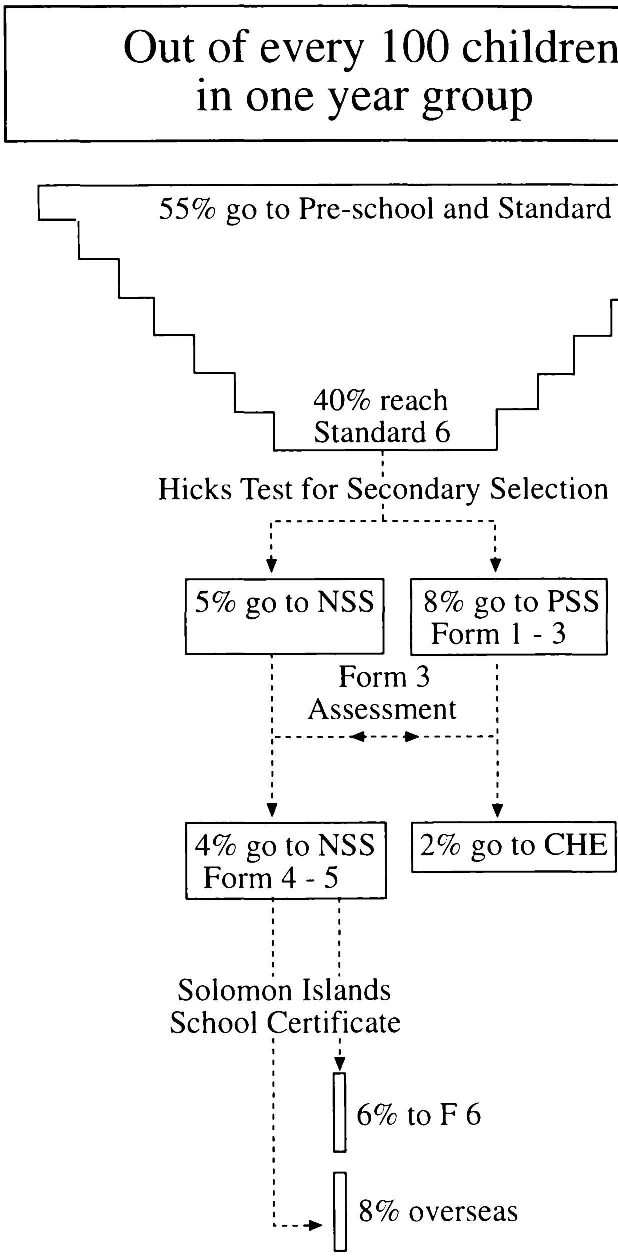
Government and the Churches. The Department of Education was established by the British Colonial Government in 1946. The Education System was structured in two ways (a) the policy and administration structure was responsible for the organisation of the ministry office, the implementation of the educational policies and the actual day-to-day running of the ministry while (b) the schools and academic structure, was responsible for the development and implementation of early childhood education, primary education, secondary education, tertiary education and non-formal education. This is illustrated in the schematic diagram Figure 2.4 below.

Figure 2. 4: Structure of the Education System in Solomon Islands. (Source: Statistical Bulletin No.03/96: Education Statistic 1996)



The structure of the education system (Figure 2.4) consisted of 4 levels: primary, secondary, tertiary and non-formal education (vocational training). There were 30 rural training centres in the country under 21 education authorities, controlling nine national secondary schools, 16 provincial secondary schools, 66 junior secondary schools and 556 primary schools. In general, the Solomon Islands Education System seems to have the following seven characteristics: patterned after the British System, influenced by various churches, highly structured and hierarchical in nature, very centralized, produces an elite class of academically trained people, exam oriented and controled (examination, curriculum and school inspection) and trained teachers. This is called a comprehensive system which means that, all Solomon Islanders have the same opportunity to education. This is illustrated in the 1986 Education scenario shown in Figure 2.5. The following is an explanation of the diagram. Out of 100 children each year, only 55% go to standard 1. Out of that group, only 40% reach standard 6. After the Hicks test at standard 6, only 5% go on to the National Secondary Schools (NSS) and a further 8% go to Provincial Secondary Schools (PSS). The Form 3 examination only allows 4.5% to go into Form 4 and only 2% go to the Solomon Island College of Higher Education (SICHE) after Form 4. After Form 5 (Solomon Islands School Certificate) only 0.6% enter Form 6 and only 0.8% go overseas for university study. As indicated in Figure 2.5, this system has created a bottle-neck pattern each year for Solomon Islands students.

Figure 2. 5: Education System Scenario 1986. (Source: Curriculum Handbook 1987-1988, Solomon Islands Secondary Schools)



Traditional Education

Traditional education in the Solomon Islands was participatory, which meant that every child born into the society must learn to participate, as a preparation for life. Ki'i (1994, p. 1) viewed traditional education as a sentiment of obligation as expressed in this statement:

> Adaptation to these earthly phenomena was an obligation required of a Solomon Islander to sustain life in his/her own environment.

Traditional education teaches respect, values, moral, responsibilities, living-skills and kastom (See Appendix A, Table 4 for a detailed description of indigenous Solomon Islands Living Skills).

Church Education

Five main churches have influenced education in the Solomon Islands including: the Anglican Church, the Catholic Church, the Methodist Church, the South Seas Evangelical Church and the Seventh-day Adventist Church (Bennett, 2000; Fangalasuu, 1994; Ferch, 1986; Fox, 1975; Garrett, 1992; Groves, 1939; Macneill, 2000; O'Brien, 1995; Searle, 1970; Steley, 1989 and Tippett, 1967). The churches' objectives were to convert heathen Solomon Islanders to Christianity and to spread their doctrine. The churches' approach to education consisted of seven points including: the use of the mission school, the use of the Bible as a textbook, the use of the natural surroundings as part of the classroom, the introduction of practical subjects, the training was in-line with local adaptation, the introduction of reading and writing and the introduction of school materials such as the slate and the pastels.

Colonial Education

Although the Solomon Islands became a British Protectorate in 1893, nothing was done by the Colonial Government regarding education for Solomon Island people. Groves (1939, p. 1) wrote:

> The government of the British Solomon Islands has taken no active part up to date in the provision of educational facilities for its native people.

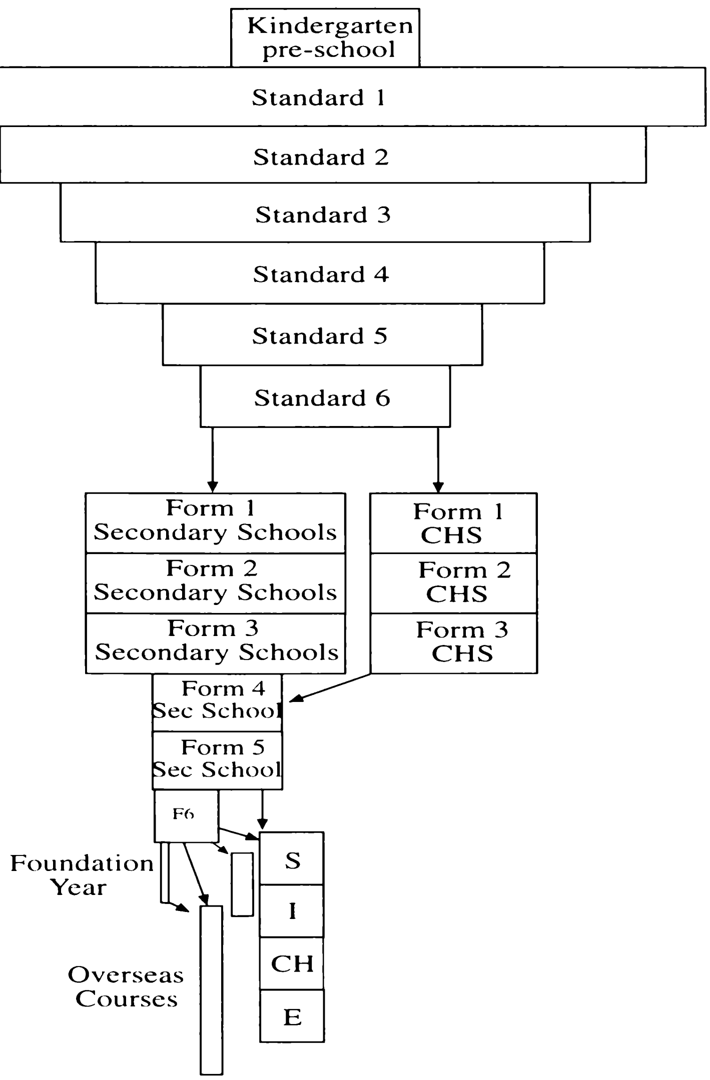
The colonial administrator acknowledged this passive role in education in the 1957-1958 Education Policy Paper. However, the education policy paper of 1962 was responsible for the following developments: a pool of trained teachers, a gradual rise in primary school teachers, the shifting of the King George VI school from Auki to Honiara in 1966 and the recommendation that the five main churches establish five national secondary schools (Ki'i, 1994; Solomon Islands Teachers College, 1981).

Post Independence Education

The 1975-1979 Education Policy became part of a post-independence education development programme. It recommended the following: the establishment of 20 new schools in the rural areas, the establishment of 12 Provincial Secondary Schools (PSS) in 1975, that the five existing national secondary schools were also up-graded to Form 6, that the South Pacific Secondary School Certificate (PSSC) to be set at Form 6, the establishment of the Community High Schools and the Rural Training Centre (Geomar International Report, 1997; Ki'i, 1994; Saunana, 1978; Solomon Islands Teachers College, 1981).

Formal Education

Figure 2. 6: Present Structure of Solomon Islands Education System 1996. (Source: Julian Treadaway Report 1996. p. 6)



Formal education began with the mission schools with the introduction of classroom teaching. Government involvement in the education of Solomon Islanders came after 1939 (Groves, 1939). Further future directions of education were developed from two report documents: Education for What? (Bugotu, 1972) and Education for who? (SINURP, 1994). The former document viewed this education system as foreign, too academic, not practical and said that it did not meet the needs of the country while the latter highlighted the participants of the education system and addressed the issues of equality and fairness. The priority of the present education system included: the improvement of educational access, the quality and relevance of education and the development of technical training programs (World Bank: 1993a,b). A schematic diagram of the present system of education is illustrated as Figure 2.6.

- **Existing technical education**

Practical education was first introduced by the mission schools (Groves, 1939; Searle, 1970) but it was not until the colonial government's involvement in the education programme that technical education had any significance to the people and the country. The present education system provides educational opportunities in academic subjects and technical subjects. The technical subjects were classed as electives because they were not compulsory subjects. The existing technical curriculum is divided into two parts primary and secondary. Primary school (Standard 1-6) subjects included: community studies, health education and agriculture provided activities for technical education. Secondary school (Form 1-Form 7) subjects included: agriculture, industrial arts, home economics, mechanics, business studies, design and technology. Subjects at both levels were regarded as 'electives' and offered at lower levels.

The existing technical education curriculum is developed from recommendations made in several reports. The Morke Report (1965) recommended the establishment of twin regional marine training centres. The British centre at Honiara and the French centre at Port Vila. The Carswell Report (1966) recommended the establishment of a Polytechnic. The Gailer Report (1967) proposed four levels of training: the training of operators through short courses, the training of artisans already in the work force, the training of skilled tradesmen and clerical staff to meet long term needs and the training of technicians, senior or advanced craftsmen and sub-professional technicians. To meet these requirements, the Honiara Technical Institute (HTI) was established in 1969.

Other reports which also influenced the direction of technical education includes: the World Bank Report (1993a,b) which highlighted the deficiency and marginal growth of technical professionals in the country, the AIDAB Report (1991) which emphasized the need to steadily increase the size and diversity of the skilled workforce to meet emerging needs and technological development, the Davis Report (1992) which emphasized a desire for a renewal of direction, the Maetia Report (1996) which exposed the urgent need to encourage skills for self-employment in young school drop-outs and addressed the vocational and technical training needs of the vast majority of people, the Treadaway Report (1996) which revealed students lack of self confidence in practical skills at both the Provincial Secondary School (PSS) and the National Secondary School (NSS). The Treadaway Report proposed a new educational structure to close the gap between technical education and academic education. It recommended that at the primary school level (Standard 1-6), all children would have equal opportunities to education. At the secondary level, students should either go through National Secondary Schools or through Community High Schools. At Form 4 and Form 5, students would be streamed into either technical subjects or academic subjects. After Form 5, students will proceed to Form 6 then on to university study either in technical or academic fields. This proposed new structure (Figure 2.7) is illustrated on page 33.

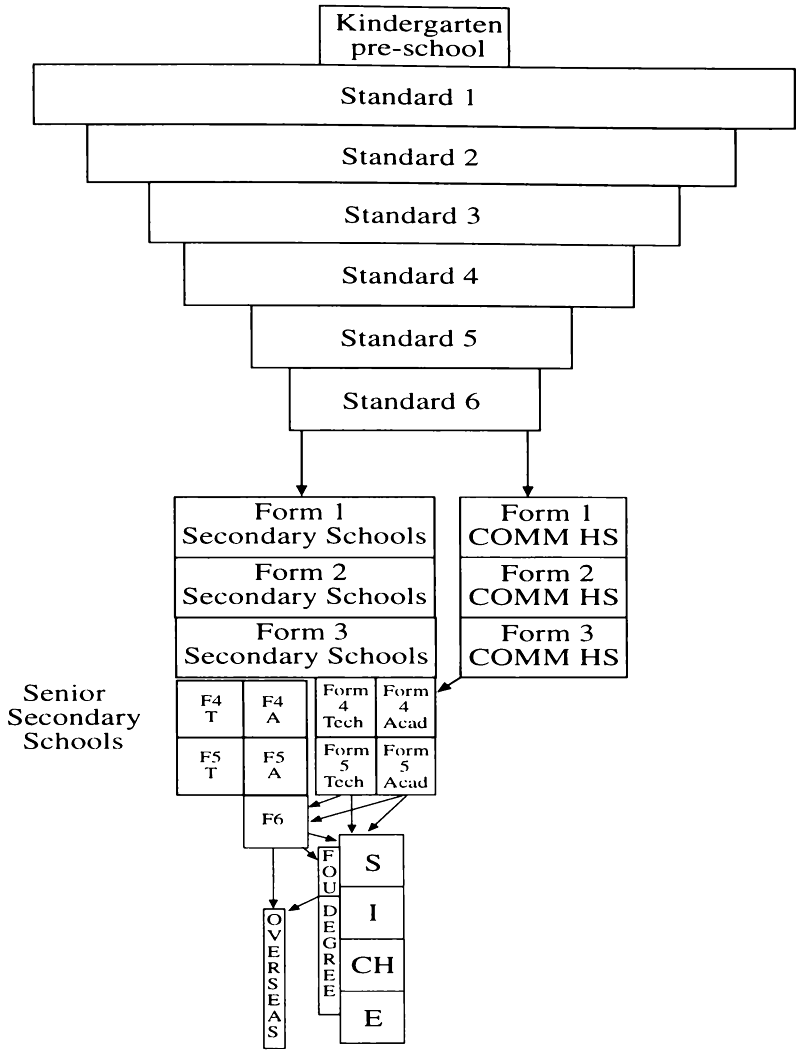
Training and Career

Opportunities for obtaining a scholarship for technical training were limited as the emphasis was on the academic subjects. The existing school system also did not prepare students for further technical training. Students lacked the abilities required by local or overseas institutions. As far as job availability was concerned having the right qualifications was the main problem for example, there were 91 secondary school vacancies in the country and they all needed trained technical teachers, which were unavailable (Ki'i, 1994).

Streaming of technical education subjects

The streaming of technical subjects was a continuation of the colonial system which placed technical subjects at a lower level than academic subjects. Four agents which perpetuated this practice were local kastom, mission school, colonial administration and the existing education system. While all secondary schools were co-educational all practical subjects were streamed. Males dominated subjects such as woodwork, carpentry and agriculture, while females dominated subjects such as typing, sewing and cooking. The Solomon Islands is a male dominated society, therefore subject streaming could remain in place for sometime yet in the future.

Figure 2.7: Proposed Structure of Education System, 1996, indicating streaming will take place at Form 4 & Form 5. From Form 6 students will enter university to study in either a technical or academic stream. (Source: Julian Treadaway Report 1996. p. 7)



Facilities and Equipment

Most facilities, equipment and tools are out dated and need maintenance. This situation is the same in all of the schools as funding is limited. Most machines were obsolete and were working well above their capacity, while facilities for academic subjects were constantly being maintained and up-graded. Buildings for technical education were often neglected, due to constant economic constraints, as getting government funding for technical education is difficult. The Solomon Islands were also very dependent on foreign aid and other financial organisations, such as the World Bank and the IMF to fund projects. Recently, two years of ethnic tension has taken the Solomon Islands back 20 years, which has drastically affected the development of technical education.

General attitude towards the technical education curriculum

As practical activities were a part of the general lifestyle of Solomon Islanders, the general attitude towards technical education was one of acceptability, although technical education has been marginalized at school. In the school system, some prejudice towards technical education does exist. Today the Solomon Island parents do not want their children to enroll in technical subjects, because they think that these subjects are not financially rewarding. They prefer that their children have the prestige of studying academic subjects. The placing of technical subjects as electives/options in the secondary schools also reduces the status of technical education in the eyes of the community. However, in the village setting technical activities remain important.

Support for technical education

The Solomon Islands Government is very much aware of the existing technical education curriculum problems within the school system, but the offering of support has been hampered due to financial and resource constraints. The Ministry of Education has tried to be supportive of technical education as is reflected in past reports (Maetia Report, 1996) and government educational policies (SINURP, 1994).

In retrospect, the education system of the Solomon Islands was influenced by the following education review papers and education policy documents: the Groves Report of 1939, the 1954 Regulations, the 1962 White Paper on Educational Policy, the Morke Report of 1965, the Carswell Report 1966, the Gailer Report of 1967, Bugotu report of 1972, the Legislative Assembly Debate on Education Policy 1975–1979, the Education Policy 1975–1979, the Education Review of April 1978 based on the conclusions of the Council of Ministers, the Education Act 1978, the Davis Report 1992 and, the Treadaway Report 1996 (Ki'i, 1994; Solomon Islands Teachers College, 1981).

- **Indigenous technology**

Indigenous technology in this context means Solomon Islands living skills as practiced by Solomon Islanders today. Indigenous technologies were developed by ancestors while interacting with the environment and their surroundings. Indigenous technology in the Solomon Islands is real, authentic, tangible, workable, functional and practical. Indigenous technology has survived many generations and is passed on from father to son and from mother to daughter (Liligeto, 1984). Indigenous technology was learnt through participation (Ki'i, 1994). Solomon Islands indigenous technology includes: gathering (ene chero), hunting (ene chie), farming tavete chigo), fishing (pita ihana) and making artefacts (ria tingitonga). In the Marovo language 'kino' means living together (ko vari hagonoi); sharing together (va hia); working together (vari va tokae, vinari tokae) and, building together (vari tavete tokae) which is the Solomon Islands way of life. Indigenous technology is also about the management of a sustainable environment and a sustainable lifestyle for transcending generations.

The nature of Solomon Islands indigenous technology is described as simple, old, traditional, sacred, practical, functional, non-transferable and cannot be measured in monetary terms. Indigenous technologies are gender biased and there is no cross-over or unisex activities. These boundaries are restricted and very specific, and crossing boundaries may mean breaching protocols. Indigenous technologies are highly valued, respected and guarded with pride because of their origin. Solomon Islanders believe indigenous technologies were God given and therefore were practiced with authority and dignity. Solomon Islanders are very traditional people and are very proud of their culture. Therefore, indigenous technologies still play a significant role in their lifestyle even into the 21 century.

Indigenous technology in the Marovo Culture (Hviding, 1992, 1995ab, 1996) can be divided into three main categories as follows: those pertaining to land (puava) including gathering (chengechenge), collecting (chero), hunting (ene chie, ene goana), clearing (ropa, va lumocho), digging (heli, teteuru), gardening/farming (tavete chigo), planting (choku), ploughing (heli kola puava) and setting traps/snares (tavete laku) are common. Those pertaining to fishing (chaba) both in the sea and fresh water (kavo, idere oro karaka) including fishing rods with string (sasaburu/hipuru), fishing using plain string (vekovekoi), diving (tope ihana), reef walk spearing (babao, ranga) and diving with a torch at night (juke ipu), poisoning fish using bush leaves (bunabuna), catching tuna with fishing line (valusa), netting fish (vagara), catching fish with a spear (babao/ranga), spearing fish with hands (huma ihana), spearing fish using a fishing gun (honahona) and fishing nets using bush vines (ara).

Those pertaining to the sky (veluvelubangara) include skills and techniques of fishing using kites (valuvalu), navigational purposes (tiro cheru) and season fishing (omi paleke) by reading stars and weather patterns. A summary list of Indigenous Solomon Islands Living Technologies is shown in Appendix A, Table 4.

2.6 SUMMARY

The education systems of Fiji and the Solomon Islands were introduced and influenced by the various churches. However, the colonial government took part in education later, and basically provided protection through the introduction of law and order. With this support, physical, educational and economic development were made in both rural and urban areas. However, being located in the earthquake and cyclone belt, both countries are prone to natural disasters. Due to western influence both countries are also experiencing a change socially, economically and politically.

Fiji, has a population of 784,000 (Forum, 1996) and is a multi-racial nation, although there are two major races (the Taukei and the Indo-Fijian). The economy is very much dependent on tourism and sugar. Fiji has a reasonably good education system and is considered to be the education centre of the South Pacific (Jones & Pinheiro, 1997). Technical education is optional and viewed as a vocational subject rather than an academic subject. The Methodist Church and the Catholic Church, the two main churches in Fiji have had major influence on the education system. Fiji hosts many international organisations which have established offices in Suva. Fiji follows the British West Minister System and the American Presidential System of government. However, in domestic and internal matters, the Great Council of Chiefs has great influence in decision-making.

The Solomon Islands is a multicultural nation but, is predominantly Melanesians, and is also the home of Polynesians, Micronesians, Asians and Expatriate Residents. The population is 441, 000 (http//.www.lycos.com). It has a democratic parliamentary system of 50 members. The Prime Minister and the elected members serve for four years until the next election. The economy is agro-based and also exports canned tuna and palm oil. Education is neither compulsory nor free. There were originally five main churches which influenced the education system namely: the Anglican Church, the Catholic Church, the Methodist Church, the South Seas Evangelical Church and the Seventh-day Adventist Church. Technical education was also first introduced by the mission school. Technical education is termed 'elective' and 'school-leavers,' are offered further basic technical training in rural training centres.

This chapter provided information on the existing technical education curriculum in Fiji and the Solomon Islands. The next chapter (Chapter 3) discusses technology and technology education.

CHAPTER 3

TECHNOLOGY AND TECHNOLOGY EDUCATION

Technology is a force that reshapes society, the dominant organizer which fundamentally changes everything. John B Gradwell, (1999).

3.1 INTRODUCTION

The previous chapter discussed the existing technical education curriculum of both Fiji and the Solomon Islands. This chapter will focus on technology and technology education.

Technology and technology education are two commonly used words in our daily language (Burns, 1997) but interpretations may differ. The variation of translation and interpretation reflects the diversity of the human race (Salinger, 1998). Differences of interpretation could be attributed to cultural heritage, education and up-bringing, technology advancement and exposure to international trends. Technology is a multi-purpose word to describe static or a dynamic action and is perceived as a theory, knowledge, an application, a process, an artefact and a practice. Technology is part of human history and is constantly changing. Technology affects the human race and the environment. Technology has now become part of our daily activities therefore it needs to be taught in schools. Although technology is as old as the human race, it is only in recent years that there has been growing interest in technology education (Chinien, 2000). This shift in interest has been fueled by world economies and the need to develop a technologically literate population.

The importance of technology was obvious in its recognition as a new classroom subject (Lewis, 2000). Internationally technology education is advocated as a new, distinct, separate, independent classroom subject (Layton, 1993; McCormick, Murphy & Harrison, 1992). Ultimately, it is expected to enhance technological literacy in the classroom (International Technology Education Association, 2000; Morgan, 1994b; Ministry of Education, 1995).

This chapter is divided into seven sections. The remainder of this chapter reports on:

3.2 Nature of Technology.
3.3 Nature of Technology Education.
3.4 International Trends.
3.5 New Zealand Leads the Way in Technology Education.
3.6 South Pacific Trends.
3.7 Summary.

3.2 NATURE OF TECHNOLOGY

An understanding of the nature of technology is essential before any discussion can be undertaken on technology education. However, it would also be appropriate at this point to be reminded of what technology is. The International Technology Education Association (2000, p. 2) defined technology as follows:

> Broadly speaking, technology is how people modify the natural world to suit their purposes. From the Greek word techne, meaning art or artefice or craft, technology literally means the act of making or crafting, but more generally it refers to the diverse collection of processes and knowledge that people use to extend human abilities and satisfy human needs and wants.

Writing about the nature of technology is not easy because the nature of technology is still unclear. It is in a way an abstract and an unknown concept. Various viewpoints have been put forward supported by a lot of evidence yet it still remains enigmatic. According to the International Technology Education Association (2000, p22) the main problem for most people is that their understanding of technology is as illustrated in the quote below:

> Everyone recognizes that such things as computers, aircraft, and generally engineered plants are examples of technology, but for most people the understanding of technology goes no deeper.

The nature of technology varies according to different authors. The diverse interpretation of technology include words such as knowledge (Custer, 1995, Waetjen, 1987); method (Hansen & Froelich, 1994); practical method (Gardner, 1994); technik (Hansen & Froelich, 1994); applied science (de Vries, 1996); volition (Custer, 1995); hardware (Mesthene, 1970); process (Custer, 1995, Mitcham, 1980b);

social process (Naughton, 1986); artefacts (Custer, 1995; Gardner, 1994); and cultural phenomenon (Pytlik et al, 1985). Goetsch and Nelson (1987) explained that resources, tools, processes and people are elements of technology. They further explain that technology is people using tools, resources, and processes to solve problems or to extend their capabilities. Hacker and Barden (1987) suggested that technology is the use of knowledge to turn resources into goods and services that society needs. Technology is therefore the sum of all human knowledge, used to transform resources in order to meet human needs. The nature of technology is demonstrated through the various views of individuals.

According to Gardner (1997) technology is a synthesis and evolved process and can be grouped into five categories :

1. Artifacts and physical objects for example, an answering machine that uses computer chips instead of audio-tape.
2. Techniques for example, the set of skills and procedures of construction required to make an artefact.
3. Invention, design, innovation, dissemination and improvement for example, the technologist who improves technology
4. Technological system for example, a communication system such as the telecommunication network.
5. Technology (with a capital T) such as a subject area, a field of specialisation, a segment of the school, college or university curriculum for example, the subject, food technology.

Gies (1982, cited Hansen & Froelich, 1994) considered technology as tools, machines, power, instrumentation, processes and techniques, while Swernofsky (1989a) viewed technology as products, application and practice. The product is the end result of an application and a practice. Naughton (1992a) described technology as things, human activities and social processes. Technology as a thing is equated with machinery and hardware, such as the usage of houses to live in, or a car for transportation. Technology as a human activity is further qualified by the definition 'technology is the application of scientific knowledge to practical tasks by organisations that involve people and machines.' Technology in this sense involves the application of special knowledge which in this case is scientific and not just any type of knowledge. DeVore (1980) viewed technology as an intellectual endeavour. Mather (1995) interpreted technology as artifacts, inventions and processes. Technology as artifacts means machines which are invented as the result of the design process. However, Franklin (1992 cited in Conway, 1994) argued that technology is not the sum of the artefacts, of wheels and gears, of the rails and electronic transmitters but a system involving an organisation, procedures, symbols, new words, and, most of all, a mindset. Sparkes (1992) described technology as applied sciences. Burns (1997) considered technology to be products, the process and innovation and Shield (1996) viewed technology as an implementing of ideas. Feeberg (1999) equated technology with power while Gradwell (1999) viewed technology as a force. Technology is also listed by Mitcham (1994a) as will, drive, motive, aspiration, intention and choice. Furthermore, Mitcham (1980) also viewed technology in four basic ways, namely: as an object, as a process, as knowledge and as volition. Hansen and Froelich (1994) explained that technology is the means by which people mediate between nature and themselves.

Postman (1992) believed that technology is a branch of moral philosophy. Bunge (1973) argued that technology is a major organ of contemporary culture and is seen as a basis to develop culture. This was endorsed by Wan (2000) when he regarded technology as a cultural construct. Swernofsky (1989b) asserted that technology was the product of man's vision, imagination and self sustaining process. Stone (1996) viewed technology as shareware to describe the sold or given away technologies, such as the electronically and electrically driven based information technology products such as computer software or the portable cassette tape recorder. McCormick (1992d) and McGinn (1978) considered technology as being a range of human activities, value judgments, definition of content and selection processes. Dyrenfurth and Mihalevich (1987) believed the essence of technology was the human ability to do work effectively and efficiently. Burns (1997) remarked that technology has become a part of our every day language. The problem for today is now in the interpretation of technology, that is, viewing technology from different perspectives.

Why study technology? Conway (1994) argued that value is the central component of technology. She quoted Prime (1993, p. 30) who emphasised value in technology:

> There is a sense in which technology, both its products and its processes, represents the embodiment of the culture. We create the thing we value, the things we think beautiful or useful. We devise tools, machines and systems to accomplish the ends we value. ... Our beliefs, our values, our philosophies, our experiences, in short our culture, is made manifest, in part in the artefacts and system we create.

Franklin (1992 cited in Conway, 1994, p.114) also supported this by saying "today the values of technology have so permeated the public mind all too frequently what is efficient is seen as the right thing to do.' Not only is technology valuable but it is also influential. Grant (1986, p32) had this to say about the influence of technology on human values:

> The influence of technology on human value is not just indirect (as in machines) but also direct....The use of the various medical and biotechnological techniques is forcing us to redefine what such common terms as birth, parenthood, quality of life, and death now mean. Our expectations concerning survival, longevity, suffering, and the duties we owe to each other in these processes are rapidly changing... The coming to be of technology has required changes in what we think is good, what we think good is, how we conceive sanity and madness, justice and injustice, rationality and irrationality, beauty and ugliness.

Grant stated clearly that the influence on humans and the environment is significant and cannot be ignored. Martin (1998) suggests that it is a potent force for change.

3.3 NATURE OF TECHNOLOGY EDUCATION

An understanding of the nature of technology education is necessary prior to the discussion of technology education as a classroom subject. Next some background information for technology education will be provided in this section.

The nature of technology education is seen in classroom activities. It is described and built into the definition, "a planned process designed to develop students' competence and confidence in understanding and using existing technologies and in creating solutions to technological problem." (Ministry of Education, 1995). Technology education is relatively a newcomer to the curriculum (McCormick, Murphy & Harrison, 1993c). It is a distinct, independent, separate classroom subject and is gaining recognition internationally (Jones, 1999; Lewis, 1991, 1995). It is interpreted as the basis for understanding the increasingly technological world in which we live in (Mankato Technology Education Department, 1998).

It was noted by Swernofsky (1989c) that technology education is the first step towards restructuring the American educational system into one that better reflects a society in constant technological change. In comparing traditional and new technology classroom subjects, Swernofsky (1989b) explained that manual arts reflect a handcraft society, industrial arts reflect an industrial society and technology education reflect todays information processing society. Swernosfsky (1989c) viewed technology education as being a broad based classroom subject embracing five aspects as listed below:

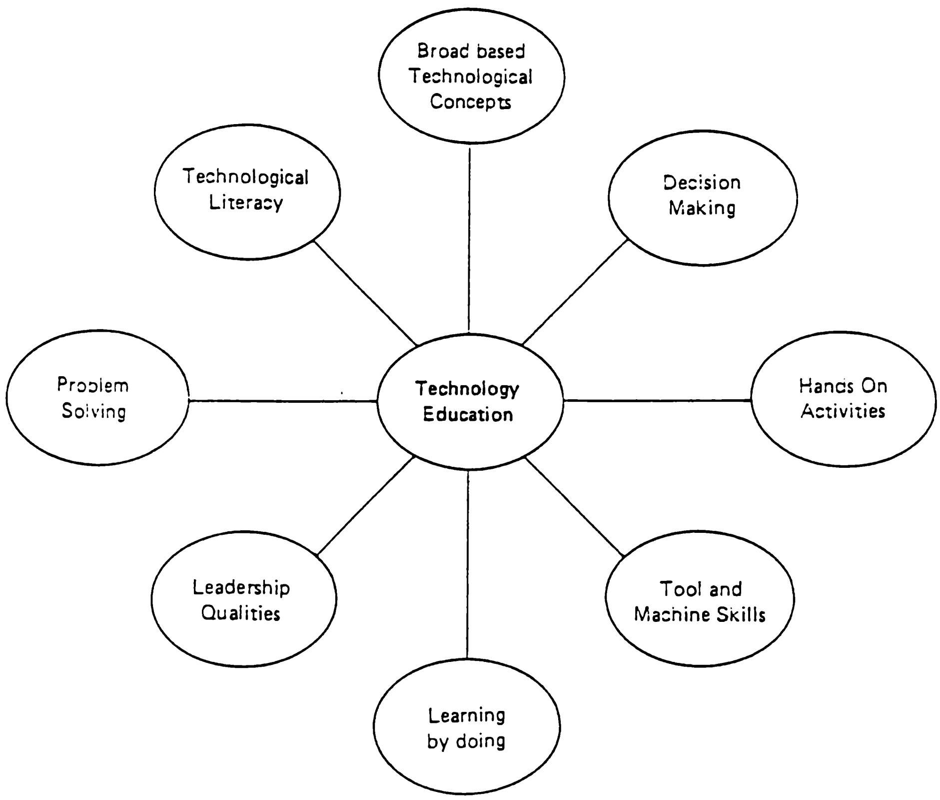
1. Broad-based concepts generic to all technologies.
2. Activity-based instruction.
3. Study of the social as well as the technical aspects of a technological society.
4. Leadership and responsibility for decisions.
5. Creativity and problem-solving.

Swernofsky (1989c, p.13) gave an appropriate definition to the five aspects above, which suggested a holistic approach as follows:

> Technology education is the interpretation of technological processes, products, services and their impact on society and the environment through activity-based instruction; the promoting of leadership and responsible decision making while engaged in technological problem solving; creation of technological literacy.

The definition interprets technology education as technological process, products, services and their impacts on the environment and society. Technology education is also responsible for other outcomes such as technological literacy, problem solving, leadership qualities, learning by doing, tools and machine skills, hands on activities, decision making and broad based technological concepts. The 8-point diagram shown as Figure 3.1 below, illustrates this approach.

Figure 3. 1: An 8-point Technology Education Concept-Based and Cluster-Based Approach (Source: Neal Swernofsky, in 'Making Technology Work,' 1989, p. 14)



The New Zealand Technology Education Curriculum added two other aspects: technological knowledge and the relationship between technology and society.

The 8-point technology education concept-based and cluster-based approach as illustrated above covered eight main domains of human activity which are essential for various lifestyles. They are separate and independent components but serve one main purpose of technological competence. A person who is well educated technologically will be confident and competent to perform activities of a technological nature.

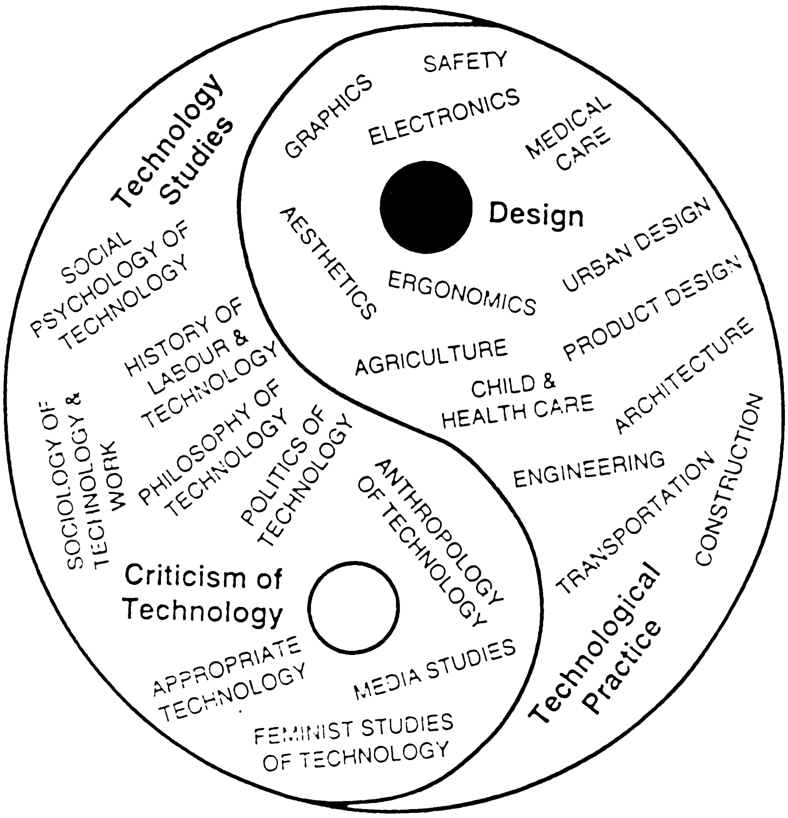
According to Black (1994), technology as a classroom subject can be categorized into five main perspectives namely:

1. Technology as craft skills - linked with the making of things manually and being vocationally oriented.
2. Technology as design and make - an expanded version of the first but incorporating elements of design.
2. Technology and Science - applying the knowledge of science as in applied physics.
4. Technology as design and application of scientific principles - focuses on the process of design, manufacturing and exploration of purpose and value.
5. Technology as practical capability - focuses on co-operation, defining needs, design, implementation and evaluation as solutions.

Petrina (1998) used the Chinese Yin-Yang symbol (or Chinese world view) to illustrate the multi-dimensional interdisciplinary technology education concept. This Yin-Yang symbolizes equality and the strength of the classroom subjects. The Yin-Yang technology education curriculum is of two distinct divisions: theory and practice and these are seen as separate but distinctly equal parts. Technology education is truly a multi-dimensional interdisciplinary curriculum which is illustrated by the numerous subjects shown within the Yin-Yang symbol diagram (Figure 3.2).

The diagram (Figure 3.2) shows the four distinct multi-dimensional interdisciplinary technology education curriculum areas. They include: Technology Studies, Design, Criticism of Technology and Technological Practice. Under these four groups are classroom subjects which cover various aspects of technology education.

Figure 3.2: The Yin-Yang Multidisciplinary Technology Education Curriculum Areas. (Source: Stephen Petrina, Multidisciplinary Technology Education, International Journal of Technology and Design Education 8, 1998, p. 103-138).



The Yin-Yang symbol portrays technology education as a multi-dimensional interdisciplinary learning area. The Yin, the left portion of the circle has a white spot while the Yang, the right portion has a black circle (Bowker, 1997). Two of the technology curricula within the Yin portion of the diagram in Figure 3.2 are Technology Studies and Criticism of Technology covering: social psychology of technology, history of labour and technology, sociology of technology and works, philosophy of technology, politics of technology, appropriate technology, anthropology of technology, media studies and feminist studies of technology. Technology curriculum areas in Yang are Design and Technological covering graphics, safety, electronics, aesthetics, ergonomics, urban design, agriculture, product design, child and health care, architecture, engineering, transportation and construction (Patrina, 1998). The Yin Yang symbol is also used by Petrina to illustrate the inter-linking of contents, theory and practice of technology education as a classroom subject.

In contrast, Wicklein (1997) viewed technology education as a profession. Technology is the practice of developing production through the usage of artefacts having an impact on humans and the natural world. Technology education therefore, should encourage students to study the following (Wright, 1992):

1. Processes used by practitioners (technologists) to develop new technology (this may include critical thinking and problem solving).

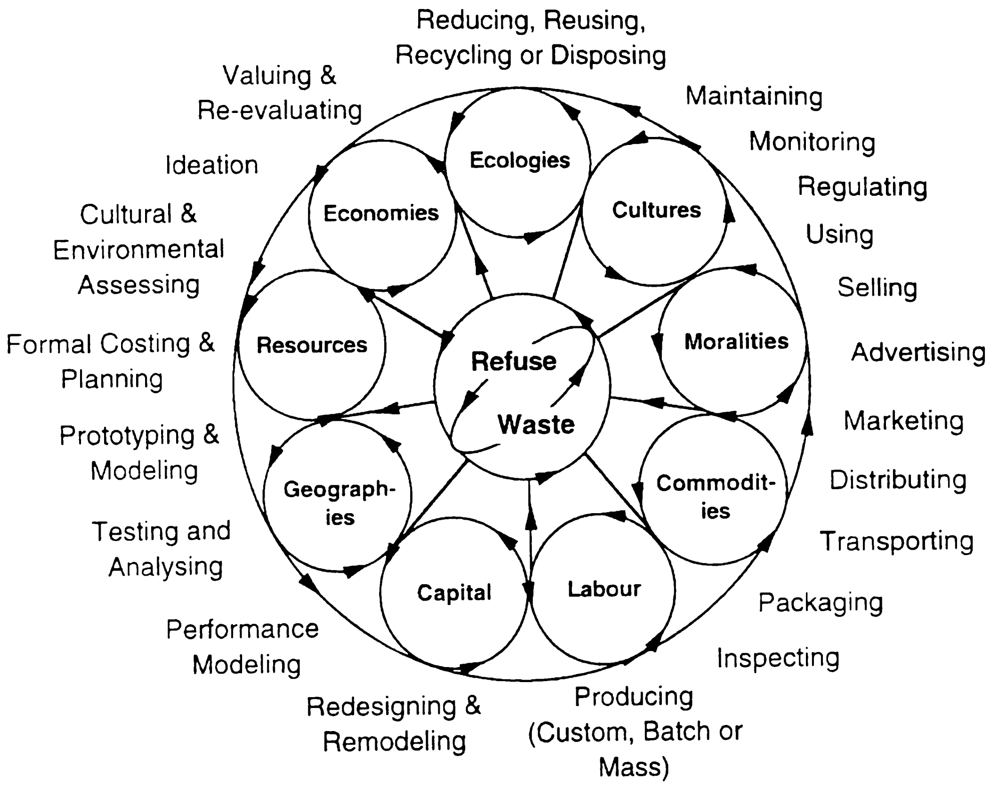
2. Areas of technology which represent the accumulated knowledge of practice (specific technological applications).

3. Impacts of technology on society and the environment

A significant characteristic of technology education is that it places great emphasis on incorporating activities that are purported to be state-of-the-art (Volk, 1996). In other words, technology is past, present and future. Technology education is a continuing force (Gradwell, 1999) which can change prevailing attitudes and improve the out look of students, teachers, parents and educators who have been locked into traditional patterns (Martin, 1998). Technology education is becoming a recognised school subject which could change the whole perspective of the future. Technology education is an international educational force that can link countries throughout the world and promote understanding and solve international problems. Technology education for the South Pacific countries could open up many opportunities in research, job diversification, physical development, training, discoveries and provide opportunities for the countries of the South Pacific to develop their own resources.

Another significant aspect regarding the nature of technology education, is its influence in shaping and designing the day-to-day lifestyles of the human race internationally (Petrina, 2000). This day-to-day life cycle (interaction relationship or activities) affects all human races regardless of the location and level of technological literacy globally. However, it has the greatest effect on nations with high level of technological literacy. This influence and impact affects all countries both those that have a low consumption rate of technological products (knowledge, skills, machines etc) and countries that have a high consumption rate. Every aspect of human living (life cycle/lifestyle) today is influenced by technology. In essence, technology and technology education influence and have an impact on all human activities. Petrina (2000, p. 228) illustrated this human-technology interactional relationship in Figure 3.3.

Figure 3.3: The design of human living internationally through influences and impact of technology and technology education. (Source: Political Ecology of Design and Technology: Designing Life Cycle in International Journal of Technology and Design Education, Volume 10, No. 3, 2000. p. 228).



3.4 INTERNATIONAL TRENDS

International trends in technology education include the momentum of recognition it is gaining as a separate, distinct, independent cohesive classroom curriculum. It is gaining popularity as a school curriculum. This trend is healthy as this allows countries to learn from each other. Many countries have used their initiative in developing their own technology education curriculum. Certain individuals have also worked tirelessly to make technology education an independent classroom curriculum. In Africa, technology education is being recognized as the gateway to technological literacy (Kerre, 1994). In New Zealand, the aim of technology education is to enable students to achieve technological literacy through the development of technological knowledge and understanding, technological capability and technology and society.

- **Influences of Technology Teaching Traditions**

Many countries agree on what constitutes technology education at a policy level (McCormick, 1992). However, there are distinct differences in the practical implementation in the classroom (Jones 1997). The differences in the teaching of technology reflect the different approaches taken by each country. Jones (1997) suggested the following as influences for teaching technology traditions.

Historical Traditions

History and tradition can have an affect and an influence on an education system. For example, the former British colonies adopted the British Colonial System of education. Culture has also influenced the type of technology implemented. In Nordic countries, the traditional crafts of sloyd, (craft), teknik (technique) and form are implemented (Kananoja, 1994), while in Malawi, the emphasis is on local technology. In the South Pacific, the colonial legacy is very conspicuous in the education system. Most South Pacific Countries adopted either the British Colonial System of education, or for the French speaking countries the French system of education.

School Programmes

According to Goodson (1988) the past traditional school subjects such as craft, design and arts, science, social science, technology and society; industry, productive work and education (which had aspects of technology within its framework) influenced, encouraged and shaped the development of technology. As each subject developed, technology also developed. The development of technology was further enhanced by interest groups within each subject and schools who debated various issues concerning education.

Subject Majors

The different subjects also influenced teachers' perceptions. Research carried out in New Zealand by Jones and Carr (1993) shows that teachers have different perceptions of technology education, depending on the teaching subculture and background experience. This subculture shaped teachers perceptions of technology education for example, science teachers emphasized applications of science while social science teachers focused on societal aspects of technology. An interesting feature of this study was that no teacher had a broad view of technology education, and many of the teachers may not have been aware of technology that was already a part of their teaching programme.

- **Reasons for the spread of interest and the teaching of technology education**

Both McCormick et al (1992) and Jones (1997) identified several reasons for the spread of interest and the teaching of technology education.

The Economic Imperative

Both McCormick et al (1992) and Jones (1997) identified the economy as a reason for teaching technology education. However, McCormick et al (1992) called it an economic imperative which was concerned with improving the economy through the motivation for funding for education or training initiatives by governments and industries. Jones (1997) labelled it as economic which emphasized the interaction of school students with the commercial world, as a country's economic future depends on developing products to fill market niches. International economic growth is closely linked to technological advancement. Therefore, a nation with technological know-how will improve economically. The UK was facing fierce competition from the USA, Germany and Japan and the decline in industry was counteracted by the training of manually skilled employees with the necessary expertise to fill the industries needs. New technologies such as computerized systems, require skilled workers for efficiency which were economical factors. Another aspect of the global spread of technology education was the emphasis placed on technological literacy for economic development and competitive supremacy to achieve global economic capital (Petrina, 2000). A country which emphasises technological literacy for its citizens can expect advanced technological products to sell to other less technological advanced countries. According to Jones (1997), the wider community has expressed the need to combine the development of creativity, innovation, resourcefulness, enterprise, initiative and imagination with knowledge and skills within people. In a co-operative effort, productivity will increase and the economy will improve in this changing world. However, this must all start in the classroom. In order for students to understand the commercial world, they must interact with the commercial world. The outcome of the interaction between students and the commercial world will foster a strong recognition of the importance of technological innovation.

Citizenship

The reasons to teach technology are twofold: firstly, the concern for the impact of technology and the role an individual takes in decision making about technology and its control and usage. Secondly, the need for people to survive in a technological world. Initially, people were quite anti-technology. However more understanding of technology helped to improve peoples' view of technology. One concern was the need to prepare future citizens to survive in a technological society and be aware of the effects of technology. The key factor was to encourage understanding and awareness of technology and its impacts and this was done through the improvement of technological literacy.

Intrinsic value

The educational benefits and development of an individual were the main reasons for teaching technology education (McCormick et al, 1992). In the 19th century, industrialists were pushing for manual training to improve the economy, and also teachers and educationalists were arguing for its moral, physical, motivational and pedagogical benefits to students. More recently, problem-solving inherent in technology education has been seen as educational justification. Another justification for teaching technology education was the idea that real problems require a multi-dimensional approach, and problem-solving was seen as a progressive education ideology as it is more in tune with the child's mind. A further intrinsic justification was the approach of learning technology problem-solving techniques in the same manner as in scientific investigation. The concept of 'doing' rather than knowing, and 'knowing how' rather than knowing, that is the essence of teaching technology.

Marxism

Marxism has been a powerful force in the education systems of many countries (McCormick, 1992). Marxist influences in teaching technology education have been two fold. Firstly, the concept of the rights and freedom of workers and secondly, that humans determine their future destiny from their present actions. Marx was concerned with the impact of large-scale industry in the 19th century, where craft models of work were being replaced by machines. To prevent workers being enslaved by machines, Karl Marx proposed a mobility and flexibility system to achieve a 'totally developed individual' (Marx, 1976, p. 618 cited in McCormick et al, 1992). He further advocated the handwork and technological education which was later known as polytechnical education. In essence, this was the first recognition of technology education which formed the base for the modern technology education system. Another Marxist issue was concerned with the role of productive work in defining the nature of human beings, who can create the world and change it by their actions (Ropohl, 1997).

A mixture of reasons

McCormick (1992) believes there is a mixture of reasons for the teaching of technology because each area over-laps and is interlocking and inter-dependent of each other. He further stated that the current practice and advances made by technology education were achieved over time and across traditions. Jones (1997) believed that technology was an important part of education for all students. He stated that technology had a major influence and impact on individuals, the communities, the wider society and also influenced the needs and the wants of the people. In the light of these factors, technology should be taught to all students. Apart from economics, Jones (1997) identified the following five other reasons for the development of the teaching of technology education.

1. Pedagogic

The study of teaching and learning is an important aspect of technology education in order to improve and increase technological knowledge, skills and capability. Equipped with this knowledge, students will become problem-solvers to many technological problems. Technological knowledge and capability are now recognized as crucial areas of learning and that intelligence and cognitive complexity are manifested in doing, as much as in knowing. Not only does technology education help students to understand the world around them better, but it helps them to adapt to its complex environment.

2. Motivational

Human needs and interest provide motivation for engaging in technological activities. Certain needs and interests also bring about technological activities and research in areas such as health, pollution, sustainability, conservation, population explosion, environment, communication and development in schools, institutions and governments. Technological questions can also evoke support for funding and the establishment of technology education in schools.

3. Cultural

Different cultures brought with them different and unique specialized indigenous technologies which could be brought together to enhance the development of the technology education curriculum. These indigenous technologies can be used as the entry and foundation knowledge base to technology education in schools (See Chapter 2). Indigenous technologies teach people how to survive in this world, while modern high-tech machines provide people with efficiency. By combining the old and new technologies, this will help students to better understand and appreciate the world they live in. Cultural technologies are the identity of a culture and its people.

4. Environmental

The impact of technology on the environment and the possible hazards to the environment should encourage students to take more responsibility for human actions. Students should be encouraged to study issues concerning pollution caused by mining, oil spills, logging, ozone depletion, and sustainable living because all of these are the result of technological advancements.

5. Personal

Technological literacy through technology education can provide the means to address personal needs, such as making the right decision by not producing environmentally unfriendly products at a lower cost. According to Jones (1997), technology education should encourage students to take risks, learn how to make sound decisions, be innovative and develop strategies while living in this real world.

Internationally technology education is seen to be a new emerging classroom subject which is distinct and independent from the other traditional classroom subjects (McCormick et al, 1992). It has been recognized as the vehicle for technological literacy. In this interest, Layton (1994) found that irrespective of whether a country is from a low income or high income bracket, the case for technology as a component for general education is under examination. He found that support for technology education was coming from powerful sources (government and industry). Layton also believed that the time has come for change as technology will not only affect the classroom curriculum but also the environment and the society. He argued for the emergence of technology education as an autonomous curriculum area.

- **Country Contributions**

Many countries have contributed to the development of technology education. Some have a long history of craft, vocational technical education while others have traditional, indigenous industrial education. Some countries build technology education from scratch while others already have some form of technology in their curriculum. The following is an account of countries who have contributed to the development of technology education worldwide.

The United Kingdom, Scotland and Ireland

In England, Scotland, Wales and Northern Ireland the technology education concept grew out of the craft, design and technology (CDT) curriculum but each had their own separate approaches. In Scotland technology education was determined to a large extent by the public examination system (McCormick, 1992). In England and Wales technology education was identified as a foundation subject and important enough to be called a core subject. In Northern Ireland technology education was taught through Technology and Design. Technology education in the UK was also seen as a social phenomena and it has the capacity to develop technological literacy (Young, 1992). Since it was a new classroom subject it created a lot of anxiety and confusion. According to McCormick (1992) there was a lot of confusion among teachers as most were barely competent to teach this new subject.

The United States of America

Technology education is a relatively new discipline in the USA (Swernofsky, 1989c) and is changing (De Miranda and Folkestad, 1999). Technology education in the USA was influenced by both the Russian manual training and Swedish sloyd (craft) during the late 19th century (Lewis, 1995; McCormick, 1992). Mossman and Bosner were the pioneers of technology education in the United States (Foster, 1995). Other advocators included DeVore, McCory, Todd, Barden and Hacker (Swernofsky, 1989c). The development of technology education in the USA was described by De Miranda and Folkstad (1995, p. 5) in this manner:

> From a historical perspective it is generally agreed that the majority of today's teachers and leaders in technology education were educated and trained in programmes that emphasized industrial arts, vocational education, industrial technology, or trade and industrial education.

Other agencies which promoted and implemented technology education were: Project 2001, Educating Americans for the 21st Century and the International Technology Education Association (McCormick, 1992). The diversity of state education systems and population size caused variations in course content (Dyrenfurth, 1994). Technology education was aimed at developing technological literacy. Dyrenfurth (1994, p. 60) wrote:

> Technological literacy is viewed as a continuum extending from basic awareness of technology and its impacts to a genuine capability with technology.

Technology education in America was seen as a positive step for the restructuring of the education system and an essential device which teaches children how to deal with what was termed the premature arrival of the future. It contains a specific body of knowledge with well-defined concepts, which determine the content and activities within each topic of the curriculum (Swernofsky, 1989c). The recent introduction of 'Standards for Technological Literacy: Technology Content Standards' into the school system further strengthened technology education programme in USA (International Technology Education Association, 2000).

Nordic Countries

Sloyd (craft) in the Nordic countries, had been developed as a non-vocational, practical education (Kananoja, 1994). It emphasized craft traditions, specialization skills, individual design and hands-on experience. Closer relations with the outside world and the introduction to modern production methods helped the development of technology education. Uno Cygnaeus (1994, in Kananoja, 1994) of Finland is a proponent of sloyd and wanted individuals to go through school and to be educated through work for work. Otto Salomon (1994, cited in Kananoja, 1994) of Sweden, influenced the inclusion of sloyd and teknik into the school system. In Denmark Allingbjerg (1994, cited in Kananoja, 1994) viewed sloyd as general practical education with the developmental aim of personality and mental skills. In Norway, forming and sloyd (dexterity, design, aesthetics and a sense of functionality) were the original school subjects until technology education was introduced. In Iceland the subject was called the study of picture (or form) and hand (mynd-og handment) and included aspects of technology. Due to the strong tradition in Sloyd (craft), the development of technology education in Nordic Countries will take some time to mature.

Africa

Kerre (1994) reports that technology education struggled to take root in Africa for the following reasons: firstly, political turbulence, resource constraints and the rapid population increase; secondly, the shortage of trained scholars and; finally, little opportunity to attend and to contribute to the current technology education development debate taking place in Europe and North America. Furthermore, African countries had various goals and interests, and their perceptions of the academic curriculum was a gateway to better living. Despite all of these difficulties, Kerre (1994) noted that, Botswana, Ethiopia, Kenya, Nigeria, United Republic of Tanzania, Zambia and Zimbabwe were able to introduce vocational and technology education in both primary and secondary schools. He agrees that technology education in Africa is a process where modern people are born into a technological system where they grow, work, and shape technology while technology also shapes people (Ellul, 1980, cited in

Kerre, 1994). In South Africa Ankiewicz (1995) reported on a consensus indicating that technology education should be offered for the first nine years in pre-tertiary education as a compulsory subject and for the last three years as an optional subject if technological processes meant transformation and promoted quality education.

Latin and South America

There was little development in technology education during the 1950s and the subsequent years (Londono, 1994). The 1980s were described as the lost decade because of political instability. There were also conflicting views of the term 'technology education' due to traditional craft influences. Each country had different conflicting interpretations from the educational models implemented since the 1960s. Technology education in Latin America was seen as a new field of endeavour. Londono (1994) grouped technology education into four categories as follows: as an update of technical education, as an educational application of computers, as a newer strand of educational technology and as a new dimension of education for a technologized era. The interpretative type of technology education was seen as a newer kind of educative technology which encouraged the promotion of technical universities, secondary and vocational schools.

Western Europe

There are a variety of technology education approaches in Western Europe given its geographical size. Belgium, Germany, France, the Netherlands, England and Wales were described as being the world in a nutshell, meaning that all the various approaches used world-wide were found there (de Vries, 1994). These are the six main approaches: craft-oriented approach, industrial production-oriented approach, high-tech approach, applied science approach, general technological concept approach, design approach, key competence approach and Science/Technology/Society (STS) approach. Each country in Europe has a different approach and this was seen as a drawback. In each country technology education is called something different for example, in Belgium technological education, in Germany work education/technology, in France it is called craft and technical education, in the Netherlands general techniques, in England and Wales (craft, design & technology-CDT). With constant contact through international conferences, workshops and various organizations, Western Europe should benefit from and influence national developments in the technology education curriculum internationally.

Central and Eastern Europe

In the Eastern bloc prior to political reforms, manual training was part of the general education in both primary and secondary schools. These included a study of both the theoretical and practical applications. There was a collaboration with industrial and agricultural corporations, vocational schools and technical associations (Blandow & Mosna, 1994). After political reforms, Polytechnic education was based on the principle of learning, working and sports but was rejected or marginalized because many felt it was a product of a socialist education policy. The introduction of technology to Central and Eastern Europe Polytechnics and secondary schools has been slow, due to the reaction against the separation of the traditional unified school system and the independent technology education curriculum. With political and economical reforms, the development of technology education will gradually grow within their education system.

South-East Asia

Technology education in the South-East Asian countries (mainly Malaysia, Thailand, Indonesia and Singapore) showed an increase in importance due to the perceived links to economic development. The geographical, political and economic differences of each country made it impossible for technology education development to be at the same level (Morgan: 1994a). In Hong Kong a new technology education curriculum is being proposed (Wan, 2000). In Taiwan, living technology was chosen as the future direction for future generations as it reflects the fact that technology is a human creation for human purposes. This will help all pupils to have a better understanding of technology (Kimbell, 1997). For the South-East Asian countries economic benefits from technological innovations was the motivating factor.

Australia

There is no national curriculum statement for Australia but each state operates at various levels due to different state education systems. This meant that technical education throughout Australia is also at different levels. However, they all have agreed to adhere to the 1989 Hobart Declaration for a more comprehensive technology education curriculum (Marsh, 1994). In Western Australia, the technology curriculum units were divided into material technologies and information and system technologies and more recently 'technology and enterprise' has been established. New South Wales followed the traditional design and technology programme (Kimbell, 1997) which originated from the craft educational programme.

New Zealand

Technology education in New Zealand is a new school curriculum area (Jones, 1997a). It was initiated in 1992 and became compulsory at the end of 1999. The reason for adopting technology education as a separate classroom curriculum was to promote technological literacy. The three strands for technological literacy were: firstly, technical knowledge and understanding; secondly, technological capability and finally, an understanding and awareness of the relationship between technology and society (Ministry of Education, 1995). The learning areas included: bio-technology, electronics and control technology, food technology, information and communication technology, material technology, production and process technology, and structure and mechanism which are taught in the context of a real life situation.

The development of technology education internationally is summarized in Table 5, Appendix B. The three columns provided the following information: the first column, identifies the advocators; the second column, provides a historical technology model practice; and the third column, shows the existing technology education programme.

3.5 NEW ZEALAND LEADS THE WAY IN TECHNOLOGY EDUCATION

This section gives an example of an international trend in technology education development. The New Zealand experience was seen to be the best example as New Zealand has developed a comprehensive technology education curriculum. New Zealand shifted from a tradition of technocraft education system to a technology education national programme after dissatisfaction with the education system. New Zealand is a leader in technology education development study for the following reasons:

1. New Zealand's courage to be a nation with a technology education culture is a positive example for South Pacific Island Countries who do not have a technology education culture.
2. There is now expertise in technology education curriculum development in New Zealand.

3. The New Zealand technology education model can be used as a guideline for the South Pacific Countries.

4. The content of the technology education curriculum is broad based which gives students a broader knowledge and perspective of technology.

5. The high technological literacy aim for New Zealand technology education is a positive challenge and an example to the South Pacific Island Countries.

6. Co-operation in development in the past between New Zealand and the South Pacific Island Countries should be extended to the development of a technology education curriculum.

The focus of the discussion in this section is on the development of technology education from policy to practice in New Zealand (Jones, 1999).

- **Background and Development**

There was dissatisfaction with the national curriculum in the 1970s and 1980s in New Zealand, and calls were made for curriculum reforms (Jones, 1999; McCulloch, 1992; McGee, 1997). In 1984 Russell Marshall, then the Minister of Education proposed a curriculum reform. During the early 1990s major curriculum reforms took place (Bell, Jones & Carr, 1995). In 1984 a review of the school curriculum was undertaken and a report was submitted to the Ministry of Education in Wellington. It recommended that a national curriculum be established. In 1990, the school curriculum at primary and secondary levels were revised under the Achievement Initiative project (Smith, 1991). A Ministerial Task Group reviewing Science and Technology Education was jointly set up by the Minister of Education and the Minister of Research, Science and Technology in June 1991.

A report was submitted in 1992 revealing a significant desire for learning in science and technology including agriculture and horticulture. A recommendation from the task group was the desire for technology curricula not to be imported from overseas. The outcome was a new classroom subject called technology education. Prior to 1993 New Zealand had a long history of technical education in senior primary and secondary school (Burns, 1992). These were separate subject units and were not taught in a coherent manner. They had a limited range of skills, processes and knowledge resulting from a narrow perspective (Jones, 1999). This approach hindered students with a limited level of experience and understanding of the working world and as a consequence they were unable to contribute successfully to their society. In 1992, the Centre for Science, Mathematics and Technology Education Research at the

University of Waikato was contracted by the Ministry of Education to develop a policy framework for technology education in New Zealand. The contract included five requirements which said: (a) there be wide consultation; (b) the best practice be taken into account nationally and internationally; (c) it would be consistent with other government policy in education; (d) it would take into account resources, teacher change, teacher development, qualifications frameworks etc; and (e) where possible it would give a range of options. In response, the centre prepared six policy papers (Jones & Carr, 1993). They included:

1. Rationale for technology education, including a working definition.
2. General aims and expected learning outcomes of technology education.
3. Achievement aims of technology education.
4. Strategies for implementation of technology education.
5. Approaches to teaching and learning technology.
6. Access to technology education for all.

A seventh policy paper 'assessment in technology education' was submitted at a later date (Jones, 1999). There was wide consultation carried out in the form of workshops and meetings throughout the country to determine the type of technology education curriculum the community of New Zealand wanted for future generations. The review of literature was also critical in this process in terms of the structure of the technology discipline; student learning of technology; assessment and testing; technology curricula internationally and critiques of it; and theoretical aspects of technology curriculum design.

- **Technology Education Curriculum**

To enable students to achieve technological literacy, learning is achieved through three strands as presented as follows:

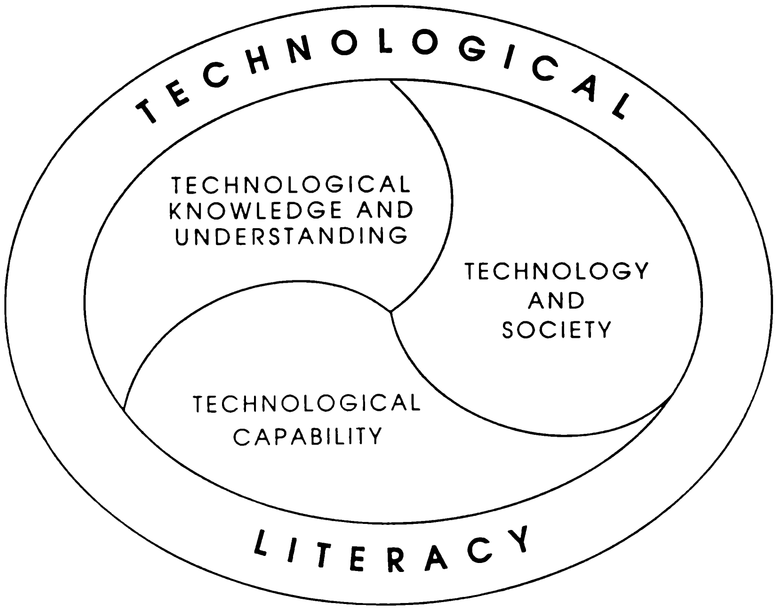
1. Technological Knowledge and Understanding – this is the ability to obtain and understand the theory and knowledge of technology.

2. Technological Capability – this is the ability to perform technological activities and tasks.

3. Technology and Society – this is having theoretical knowledge and practical application of technology and being able to relate or apply it to the environment.

Figure 3.4 given below illustrates how these three strands relate to each other. The three strands rugby ball shaped diagram for technological literacy illustrates the fact that even though they are three separate entities, they are one in purpose and that is the propagation of technological literacy.

Figure 3.4: The three strands for technological literacy. (Source: Technology in the New Zealand Curriculum, Ministry of Education, 1995, p. 8)

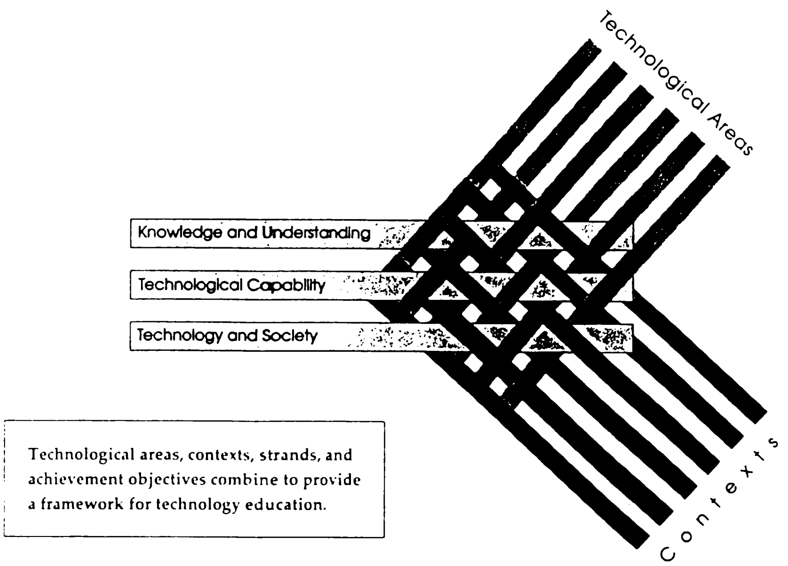


The New Zealand Curriculum Framework of 1993 identified the seven broad essential learning areas rather than subject areas namely: Language, Mathematics, Science and Environment, Technology, Social Science, Arts; Physical and Personal Development. Within this framework the Technology Education Curriculum defined seven technological areas for student learning. They include:

1. Biotechnology – the manipulation and processing of living systems, organisms, genetics and biomedical engineering to develop products etc to benefit people.
2. Electronics and Control Technology – the knowledge and use of electrical and electronic systems, devices as well as their design, construction and production.
3. Food Technology – the understanding and usage of safe reliable processes for producing, preparing, presenting and storing food.
4. Information and Communication Technology – includes systems enabling collection, structuring, retrieval and communication in various forms.
5. Material Technology – includes investigation, use, development of materials to achieve a desired result.
6. Production and Process Technology – includes both the manufacturing and assembly of products.
7. Structure and Mechanism – includes varieties of technologies for example: structures, mechanical devices, complex structures etc.

The seven technological areas for student learning are implemented in a variety of broad overlapping contexts such as personal, home, school, recreational, community, environmental, energy, business and industrial. The combination of the three components provides an interwoven framework for technology education in classroom teaching as illustrated in Figure 3.5 below.

Figure 3.5: Interwoven technology education framework (Source: Technology in the New Zealand Curriculum, Ministry of Education, 1995, p. 13)



Technology education in New Zealand is seen as a curriculum for the 21^{st} century. For this reason the South Pacific Countries should be made aware of its existence.

3.6 SOUTH PACIFIC TRENDS

This section provides some information on the current trends of technical education in the South Pacific Island Countries. This discussion will focus on the following existing organisations and institutions, namely: the Papua New Guinea Education Reform Committee of 1986, the South Pacific Board of Education Assessment body, the Fiji Education Review Commission 2000, the Solomon Islands Education Review 2000 and the Department of Engineering at the University of the South Pacific. The existing organisations and institutions as mentioned above, could be the channel through which a technology education curriculum could be launched throughout the South Pacific.

The Education Reform of Papua New Guinea is significant for this study because it revealed an indigenous community's desire to have a better system of education, which is relevant to the people and the community. This desire stems from the fact that the Melanesian lifestyle consists of activities with artefacts which are part of the lifestyle of Papua New Guineans. According to Goetsch and Nelson (1987) these formed the basis for the development of a technology education curriculum. Papua New Guinea took a bold step forwards when it reformed its education system in 1986. The education philosophy document chaired by Sir Paulias Matane (Tetaga, 1995) stated that children were alienated from their culture. The reform report blamed the present system of education for their failure in school and their alienation from their communities. It identified the following as reasons for the reform:

1. Separates children from their culture and from their community.
2. Makes children feel like failures who no longer value village life, traditions and obligations.
3. Starts in a language the children do not speak.
4. Creates unrealistic expectations for the children, their families and their communities.
5. Has a curriculum which is no longer relevant to the needs of Papua New Guinea and its people.
6. Does not prepare children to use resource development opportunities within their communities.
7. Does not give all children the opportunity to go to school and does not encourage children to stay in school.

There were three divisions of the national curriculum as follows: elementary, primary and secondary. The previous subjects of practical skills, home economics and basic technology were combined into one area of study called technology. It was recommended by the various Syllabus Advisory Committee that technology be offered from grades 6–12 (Tetaga, June, 1995). Figure 3.6 below, is an overview of technology areas in the Papua New Guinea school system from Elementary to Upper Secondary level. The students were expected to 'know how to do things' and 'understand how things work.'

Figure 3.6: An overview of the technology programme in the Papua New Guinea education reform 1986. (Source: Tetaga in 'Technology Curriculum Statement for Grades 11-12,' Draft for discussion, Curriculum Unit, Waigani, June, 1995, p. 1)

Elementary E prep E1 & E2.	Lower Primary Grades 3, 4 & 5.	Upper Primary Grades 6, 7 & 8.	Lower Secondary Grades 9 & 10	Upper Secondary Grades 11 & 12
• Culture and Community (has Agriculture, Technology and Commerce Components)	• Agriculture • Community Life (has Technology and Commerce Components)	3. Agriculture 4. Technology 5. Commerce (for Grades 7 & 8).	• Agriculture • Technology • Commerce	• Technology (has Agriculture, Rural/Urban, Applied Technology and Business Studies strands)

The Papua New Guinea education systems approach to technology was based on the 1985 UNESCO definition of technology (in Tetaga, 1995) as stated below:

> The know-how and creative processes that may assist people to utilise tools, resources and systems to solve problems and to enhance control over the natural and made environment in an endeavour to improve the human condition.

The new Papua New Guinea technology programme from Elementary to Upper Secondary level could be used as the base for establishing a broad based technology education curriculum. The various levels would suitably accommodate the various technology education teaching and learning areas.

The South Pacific Board for Educational Assessment (SPBEA) was an educational organisation set up by all the regional countries of the South Pacific (except Fiji), to monitor educational contents and assess educational standards, through a regional examination. All the academic subjects were included except technology. In the year 2000, SPBEA proposed a technology multi-modular programme from which students would choose three options. The technology module will be implemented in 2001. The technology area/modules (one per term over a three term year) will include food technology, fabric technology, wood technology, metal technology, computer graphics and design, and craft technology. Students will choose three areas of study. The aim is for technical competence and awareness. The assessment consist of a 60/40 ratio, 60% internal assessment and 40% external assessment. Decisions on the implementation will be based on the availability of appropriate resources including teachers expertise (Zindel, 1999). The rationale for the technology course are:

1. At the global level, the rate and extent of technological change has transformed the world we live in, and raised new social, environmental and ethical situations. Young people growing up in this world need a better understanding of technological developments, and need to become more technically literate and capable;

2. At a more regional level, a number of South Pacific countries have technology courses at school certificate level. These courses will mean more if students feel they can carry on with a technology subject at the PSSC level;

3. Concern has been expressed that the PSSC curriculum has been too theoretical and academic, and has not met many student's needs. This technology course has the potential to be hands-on and practical, and can serve as a background for further technical and vocational training.

This move towards the introduction of technology strands by SPBEA was a positive step towards a South Pacific technology education trend. By working together with SPBEA, a technology education curriculum could be introduced.

The Fiji Islands Education Review Commission 2000 (Fijilive.com, 1999a,b) was established under the government of Prime Minister Mahendra Chaudhry to undertake a comprehensive study of the Fijian education system. The object of the review was to improve the standard of education for indigenous Fijians and the general education of all Fijian citizens. Delailomaloma (2000, Fijilive.com) stated that "Fiji's education system had grown bigger and more ineffective over the years." The framework of the Fiji Education Review Commission 2000 report could be used as the base to introduce technology into the Fiji education system.

The Solomon Islands Education Review Committee 2000 was established under the Ulufalau'u government, to address the concept of 'education for all' and to review the existing education system. The existing education system was called the 'comprehensive system' to mean all Solomon Islanders have the same opportunities and access to education. In reality, this education system only caters for the elite few. However, due to the two years of tension in the country, the review was shelved until an appropriate date can be set. The principle of this Solomon Islands Education Review 2000 could be used as a basis to discuss the possibility of introducing technology education into the Solomon Islands.

The University of the South Pacific (USP) is a regional institution which serves 12 regional countries of the South Pacific namely, Fiji, Solomon Islands, Kiribati, Tuvalu, Vanuatu, Tonga, Samoa, Nauru, Niue, Tokelau, Cook Islands and the

Federated States of Micronesia (USP Calender, 2001). It is a very influential educational institution and has made significant contributions to the educational development of the region. Since 1994, the Department of Engineering at USP has been offering a Bachelor of Education (Technology) degree programme. This programme is for teachers who wish to teach industrial arts (Forms 1-6) and introduction to technology (Form 7) in high schools (See Appendix C for BEd, Technology degree programme). With the existence of the Department of Engineering and the Bachelor of Education (Technology) degree at USP, the introduction of technology education based at USP could spread rapidly through the regional countries with graduates as ambassadors.

3.7 SUMMARY

Technology and technology education are common words in our daily language (Burns, 1997) but they can mean different things to different people. These differences reflect the diversity of people, cultures and their ways of life. Different interpretations of technology and technology education can become a hindrance to a common understanding of these two areas. Technology and technology education are two separate entities but they compensate each other in many ways.

Technology is an elusive term due to its nature. It can be interpreted as old, new, simple, high-tech and appropriate. Technology is people using tools, resources, and processes to solve problems or to extend their capabilities (Goetsch & Nelson, 1987). Technology is also the use of knowledge to turn resources into goods and processes to solve problems or tend their capabilities. Other authors like Feenberg (1999) question the use and impact of technology while some authors (Ashton & Laura, 1998) view technology as the panacea to technological perils.

As a separate, independent, cohesive classroom subject, the technology curriculum is gaining recognition internationally. Technology education is a relative newcomer to the curriculum, but it is making an impact on students and educators. As a curriculum it is a multi-dimensional and interdisciplinary classroom programme (Petrina, 1992).

According to Wicklein (1997), technology education is a profession and a practice. Technology education helps students to be technologically literate.

In Africa, technology education is being recognized as the gateway to technological literacy (Kerre, 1994). The international trend for technology education is positive in that it creates a technology education culture which did not exist previously. A good example of a technology education culture is New Zealand where there was no previous technology education culture.

There is no technology education culture in the South Pacific. What exists is technical education, and there has been dissatisfaction concerning the existing education system. Examples in the South Pacific to improve the education system includes: the Papua New Guinea Education Reform of 1986, the Fiji Islands Education Review Commission of 2000 and, the Solomon Islands Education Review of 2000. The existence of the South Pacific Board for Assessment based in Suva, Fiji, the Department of Technology at the University of the South Pacific located in Suva, Fiji, and the establishment of the education review commissions (mentioned above), could be the base for the development of a technology education curriculum for the South Pacific. The New Zealand experience and expertise could be used as a guide to develop a technology education model curriculum for the South Pacific.

This chapter provided information concerning the nature of technology and technology education internationally. The next chapter (chapter 4) will discuss students' and educators' perceptions and the curriculum.

CHAPTER 4

PERCEPTIONS AND CURRICULUM

Human beings have always wondered about how they perceived the world in which they lived. In modern times, this wonder has stimulated behavioural, biological, and medical scientist to take up a systematic study of perception. Building on these cumulative efforts of all these people, this 'research' explains seeing, hearing, smelling, and tasting to students of perception. Robert Sekular and Randolph Blake, (1985).

Curriculum is a selection from the culture of a society, of aspects which are regarded as so valuable that their survival is not left to chance, but is entrusted to teachers for expert transmission to the young. Professor David A Layton, (1975).

4.1 INTRODUCTION

The previous chapter discussed the nature of technology and technology education. This chapter will focus on students' and educators' perceptions and the curriculum. Understanding these perceptions and how the curriculum is viewed is vital for this study. This is because students' and educators' perceptions of technology can be influential and useful in establishing a guideline and a framework for the development of a technology education curriculum for the South Pacific.

This chapter is divided into four sections. The remainder of this chapter reports on:

4.2 Perceptions.

4.3 Curriculum.

4.4 Summary.

4.2 PERCEPTIONS

Previous studies conducted on students' perceptions of technology (Burns, 1992; de Vries, 1991; Kent & Towse, 1997; Raat, De Klerk Wolters & de Vries, 1987; Jarvis &

& Rennie, 1995a/b, 1996 & 1998; Rensburg, Ankiewicz & Myburgh, 1999) have broadened knowledge and understanding about students' perceptions of technology. These studies have also indicated a need to learn more about learning patterns of students. According to Jones (1997b & 2001) there is a need for a greater emphasis in technology research on students' learning of technology and the way in which this learning can be enhanced. Students learning, according to Hansen and Froelich (1994) is concerned with multiple variables that are technical, procedural, conceptual and social. These aspects if properly planned, can enhance students' classroom learning in technology.

Past studies on teachers' perceptions of technology (de Veries, 1991; Jarvis & Rennie, 1996; Paechter, 1991; Rennie, 1988; and Symington, 1987) have also shown that teachers' past experiences (Jones & Carr, 1993) can influence the direction and development of curriculum. This is significant in that both teachers and students were partners in the development and implementation of the curriculum. Experienced teachers' views of the nature of technology and technological knowledge are also important in research (Jones, 2001). Other work looking at the way in which perceptions influence actions includes interpretation of the curriculum, classroom experience and students' perceptions influencing classroom experiences.

These studies on students' and teachers' perceptions are important to this research because they provide background information and the approach for this research on students' and educators perceptions in Fiji and the Solomon Islands. Little is known about the perceptions of the South Pacific People in relation to technology. Therefore it is important that research work focuses on the perceptions of people in the South Pacific to identify their needs and aspirations for the development of a relevant curriculum. This section will discuss the nature of perceptions, students' perceptions of technology, and teachers' perceptions of technology and technology education.

- **Nature of Perceptions**

The discussion on the nature of perceptions will be general and will cover several views offered by various authors. Perception is an opinion, a view, a feeling towards an issue or the ability of the mind to interpret external objects as the cause (The Concise Oxford Dictionary, 1991). According to Rock (1995), all scientific enquiry begins with perceptions. He believes that perceptions come in the form of visual, sensory or mental constructions. Through the visionary avenues, knowledge or images of the outside world were formed from an opinion, but as individuals are different, perceptions are also different. Rock (1995) further explained that, in order to develop perceptions, human beings must first learn how to interpret visual and mental sensations. Rock (1995, p. 4) further described perception as a mental construction of reality as illustrated below:

> Perception is the mental representation of external objects and events that based upon or in some way corresponds to the stimulation reaching our sense organ.

According to Weintraub and Walker (1968) perception is usually applied to the way one comes to know the world, or the way one experiences the world of objects and events. Heil (1983) suggested that perceptions are cognition, because what was seen externally as objects or events, are interpreted internally. Perceptions were regarded as the link connecting beliefs to ordinary physical objects and things. Bartley (1958) suggested that perceptions are usually restricted to aspects of experience but also suggested viewing perception from the following angles: (a) a form of knowing, (b) a form of thought as well as immediate behaviour, (c) a matter of sensation, (d) a judgement and (e) perceptions as synonymous to consciousness. Bartley (1958, p. 8) further defined perception in this manner:

> Perception is any act or process of knowing objects, facts, or truths, whether by sense experience or by thought; awareness of objects; consciousness

According to Sekuler and Blake (1985) perception is the final product or link in the chain of events of the conscious experience of this world. They explain that this world is filled with objects and events that combine to create a kaleidoscope of potential information. Some of this information is irrelevant to people's daily needs while others are absolutely essential. They further stated that human beings are equipped with specialised machinery for capturing this information and translating it into a language that can be understood by the nervous system. In this translated form, the selected information is digested by the brain, culminating in the perceptions of the world. These perceptions then guide people's action in the world around them. To understand perceptions, each link of the chain must first be understood. A complete understanding of perception must include a thorough description of conscious experience, which according to Sekular and Blake (1985, pp. 1-2) is the final product in this chain of events. A broad framework description of their view of perception is stated below:

> Perception represents the final product in a chain of events stretching from events in the physical world external to the perceiver, through the translation of those events into patterns of activity within the perceiver's nervous system, culminating in the perceiver's experimental and behavioural reactions to those events.

Forgus (1966) viewed perception as the process of information extraction. Forgus and Melamed (1976, p. 3) expanded by describing perception as:

> The process by which an organism receives or extracts certain information about the environment.

Furthermore they viewed perceptions as a sensational and productive brain-process which when combined gave the content of perception. Seashore (1924, cited in Bartley, 1958) explained that sensation and perception together constitute sensory experiences. Perception is the way an individual visualises things while concept is the capacities, disposition or idea (Norrekit, 1973). Perceptions are therefore the thinking portion which goes on within the brain. It emphasises how things connect and function. Rock (1995) identified four major theoretical traditions of perceptions. The four major traditional interpretations of perception traditions are as follows:

1. The Inference/Empiricist Theory – Suggested that things look as they do because of the inferences we make about what given stimuli (or sensations) most likely represent in the world. Hobbes, Locke and Humes (cited in Rock, 1995) argued that the mind at birth is blank but experience through sensations received and knowledge is acquired solely by sensory experience and the association of ideas.

2. The Gestalt Theory – Suggested that the mind imposes its own internal conception of space and time upon the information it receives (Kant cited in Rock, 1995). Descartes (in Rock, 1995) argued that the mind possessed inborn or natural ideas about form, size and other properties of objects. The central Gestalt concept was that of perceptual organisation. Whereas sensations are logically separate and unrelated, our perceptions are of whole units or things.

3. The Stimulus Theory – Suggested that there is sufficient information to be received from stimuli. It is argued that all information necessary to explain our perceptions is present in the environment, waiting to be picked up by the moving eye of the observer thus the stimuli received are integral to the mental pictures of the world the brain creates.

4. The Information Processing Theory – Suggested that the stimuli provides information that is then processed by the brain. This approach was the result of the invention of computers and Cybernetics which made use of concepts such as bits and channels of information.

In summing up these four theories, Rock (1995) said none of these constitute an adequate, unified theory of all the phenomena of perception. Rock (1995) would rather call perception 'intelligence' because its operations are like those of thoughts which are logical in its own domain. Schneider, Hastorf and Ellsworth (1979, p. 15) summarised the concept of perception in this way:

> Perception is not the passive translation of physical energies into experience, but is the process demanding active participation by the perceiver, who selects and categorizes, interprets and infers to achieve a meaningful world in which action is possible.

Existing perceptions influence the way people interpret new events. Understanding perceptions of technology and technology education is important because (a) it highlights the role and influences the teacher has on the existing education system, curriculum development and classroom teaching and learning theories through their past experiences and, (b) the influence students have on enhancing the learning process through participation in technological activities and classroom experiences to achieve technological literacy. The improvement of student's learning has been a priority in educational history. This is illustrated by the following learning theories or modes of teaching as outlined by Joyce and Weil (1980) and Jarolimek and Foster (1976): inductive sequencing (learning process from specific to general), the deductive sequencing (learning process from general to specific), the expository mode (to provide explanation), the inquiry mode (involves asking questions, seeking information and carrying on an investigation), the rote mode (habitual repetition of acquiring knowledge), the demonstration mode (illustrate, demonstrate and dramatically present ideas, concepts, and principles in an engaging way to learners), the activity mode (set of strategies that involve pupils in learning by doing things) and the behavioural theory of learning (teachers view that student's behaviour will determine how they teach or (a) frame or define problems, (b) select goals, (c) decide on appropriate intervention procedures, and (d) define success. According to Woods (1993, p. 4) the pupil needs to feel a 'degree of control' over the process of learning while teachers needs to 'build upon the child's partial understanding so that the pupil can reconstruct their knowledge and ideas in ways that make them more generally applicable.' More recently the constructivist view of teaching and learning also shows how perceptions can influence curriculum development. A constructivists' view of learning hinges on the principle that students learning is built on past experiences and what was already known (Ausubel, 1968; Begg, 1999; Bell & Baker, 1997; Driver, 1980; Fensham, Gunstone & White, 1995; Freyberg & Osborne, 1997; Gagne & White, 1978; Shayer & Adey, 1981 and Wittrock, 1975). In reference to a constructivist view of learning, Bell (1993, p23) stated that "students construct rather than absorb new ideas and learners actively generate meaning from experience." If past experience is important in the learning process then perceptions of both students and teachers are an important base, guideline and framework for the curriculum development process and the decision-making process. The social (shared) cognition is another view of learning theory, where individuals learn through social interaction, participation and socialisation (Resnick, 1991).

The direction for curriculum development is therefore based on a realistic agenda given by both students and teachers through perceptions. Therefore this is significant for this research because perceptions of technology coupled with technological knowledge, past experiences and classroom practices of both students and educators in Fiji and the Solomon Islands, can therefore influence the type and quality of technology education curriculum for these countries. Several studies have been conducted on students and educators perceptions of technology and technology education as discussed in the next section.

- **Students' Perceptions of Technology**

The reasons for studying students' and teachers' perceptions were based on past research and how they influence curriculum change, attitudes and responses to change, their commitment to curriculum change in developing learning behaviour patterns through their teaching experiences and determining school subject priorities (Ball & Goodson, 1985; Goodson, 1985; Paechter, 1991). The following studies of students' and teachers' perceptions of technology, illustrated the important role they play in the development of technology education curriculums.

A study was conducted in New Zealand on students' perception using Pupils' Attitudes Towards Technology (PATT) through issuing a questionnaire. The study found that 1,469 Form 3 students who answered the questionnaire on the nature of technology, generally had a positive attitude towards technology but lacked an understanding of the concept of technology (Burn, 1992). This study also revealed a lot of interesting information on perceptions as follows: (a) students held a limited view of technology and could not relate it to technological products, (b) students rated technological processes lower than technology as a product, (c) students recognized the benefits and disadvantages that technological development can have on society but did not recognize that technological development originated from within society, (d) students saw technological products as that of electrical and mechanical things but not as artifacts and, (e) girls saw technology as equally interesting and accessible to both girls and boys but boys did not. Meanwhile, another study carried out in the

Netherlands using the PATT showed that students aged 13 and 14 years had an overall positive attitude towards technology (Raat, De Klerk Wolters and de Vries, 1987). The same results were obtained from studies conducted in the United Kingdom, France, Denmark, Belgium and Poland. In regard to the level of interest in technology, consequences of technology, the inclusion of technology in the school curriculum and the choice of technology, boys had a more positive attitude than girls did. In Australia a PATT study found that girls more strongly disagreed that boys knew more about technology than girls (Rennie, 1987). Furthermore, the study revealed that most students disagreed that technology was too difficult for them. The study also found that students were generally interested in technology.

Another PATT study was carried out in Holland with 89 student teachers to find out what students in Dutch technology teacher programmes think of their subjects (de Vries, 1991). Using their concepts of technology, students seemed to regard high-tech things as more technological than low-tech things. Results of the study revealed that students appeared to be interested in technology. Both male and female students were interested, but males were significantly more interested than females. The study concluded that students have a fairly broad understanding of technology with some biases as follows: (a) more in favour of new than old technology, (b) more in favour of mechanical and electrical objects than bio-related objects, (c) only weakly related to science, (d) more focused on matter than on energy and information and (e) more focused on individual human needs than on societal effects.

In the Gauteng Province of South Africa, another PATT study was done on 500 girls and 510 boys to assess and analyse South African learners's attitudes towards technology (Rensburg, Ankiewicz and Myburgh, 1999). The outcome of the research was positive in that there were no significant differences regarding the gender attitudes that technology should be for all and that technology makes a contribution to society. However, the study revealed the following important points (a) girls viewed boys as more competent in technology education than themselves and, (b) boys viewed technology as being less positive. This may indicate that technological jobs could be viewed as blue collar jobs and white collar jobs have a higher status. It was argued that if both boys and girls views of technology education is low, then a more positive direction needs to be achieved if technology education is to survive.

A further PATT study was done in Hong Kong on 3,500 junior secondary school students using the Likert scale concerning (a) interest in technology (interest), (b) technology as an activity for both boys and girls (role pattern), (c) perception of the difficulty of technology (difficulty), (d) consequences of technology (consequences), (e) technology in the school curriculum (curriculum) and (f) ideas about pursuing a career related to technology (Volk & Ming, 1999). The results of this research revealed a significant difference in many items for example, taking subjects such as Design & Technology (D&T) was found to be an activity for both genders. Boys were found to have a more positive attitude towards technology than girls and all agreed that prior exposure through technical toys was important.

Kent and Towse (1997) also did a study on 500 junior secondary students' perceptions of science and technology in Botswana and Lesotho. The result revealed that there was some confusion over the differences between science and technology, but students overwhelmingly perceived both subjects as appropriate to both sexes. Results also revealed that both science and technology were viewed as important in socio-economic terms, enabling people to cope in the modern world, gain employment in both formal and informal sectors, and contribute towards national development. The study also revealed that science and technology were in conflict with traditional beliefs and cultures for example, the increasing female emancipation. Further more, the study found that the attitude of the students towards the two subjects and the impact they have on everyday life were in agreement with the philosophical aims of the science and technology syllabus of both countries.

Another study looking at the perceptions of Design and Technology in the National Curriculum was carried out using questionnaires given to pupils in South Wales (Hendley & Lyle, 1996). The survey involved 1, 675 selected students from Key Stage 2 and 3 (year 6 and 9, aged 10-11 and 13-14). The students were asked to select statements which best fitted their mental model of a good design and their image of a pupil of technology. The result showed a remarkable pattern of agreement across key stages and between genders, which indicated that gender stereotyping in design and technology is decreasing. Students also showed a very positive attitude towards key aspects of design and technology which indicated a break from past trends.

A study to compare English and Australian childrens' perceptions about technology was conducted on 800 elementary school children (years 3-6) in England and Australia (Rennie & Jarvis, 1995). Perception was measured using a writing/drawing activity, a picture quiz and a questionnaire. Results revealed that children associated technology with computers and modern appliances, but overall there was an enormous variety of ideas about technology, which were more complex and coherent among older children. Children's attitudes were positive but older children expressed less interest in technology. The difference between English and Australian children was that English children emphasised model-making as required by the England and Wales Technology National Curriculum which was ignored by Australian children. The study also revealed that teachers must accommodate the children's understanding and perception when designing their classroom instructions.

A further study by Jarvis and Rennie (1996) on children's perceptions about technology was carried out on 300 grade 3-6 children in six primary schools in the English Midlands. Children's perceptions were measured using a writing/drawing activity and a picture quiz. Again children associated technology with computers and modern appliances. Overall, there was a variety of ideas about technology which were also more complex and coherent with older children.

Another study concerning factors that influenced children's developing perceptions of technology was conducted on 315 English children in year 2-6 and 745 Western Australian children (Jarvis & Rennie, 1998). Two instruments were used to ascertain childrens' concepts of technology. Both groups showed a similar idea as to what technology is, however the number of times technology was referred to varied. The result suggested that stages of understanding concepts of technology developed chronologically but rates varied between individuals depending on many factors at home and school. This indicated that there is a need for a specific provision for technology with qualified trained teachers who could clarify the difference between science and technology, and in return children should be able to clarify their ideas on technology through focused technology activities.

The various studies conducted as illustrated above on students' perceptions and attitudes towards technology internationally indicated that students can influence the direction of the curriculum.

- **Teachers' Perceptions of Technology and Technology Education.**

Studies on teachers' perceptions have helped gain an understanding of attitudes, weaknesses, inclinations, interests and also contributed to some broad understanding of how teachers viewed technology (Bell & Gilbert, 1994; de Vries, 1991; Jarvis & Rennie, 1996; Jones & Carr, 1992; Paechter, 1991; Rennie, 1987 and Symington, 1987) and technology education (Jones & Carr, 1992). Research has also revealed that teachers generally have a subjective view of the practice of teaching within their own subject areas (Goodson, 1985). Further studies revealed that teachers tend to focus more on technology rather than on technology education as a subject which has led to the problems of implementing technology education into existing curriculum structures, in appropriate teaching and learning strategies, and in assessment procedures (Jones & Carr, 1992). Furthermore studies have also indicated that knowing teachers' priorities and ideas from past experiences, can help in the understanding of students' learning behaviour patterns (Jones & Carr, 1992; Symington, 1987). For their wealth of past experience, teachers are inevitably the vehicle used in creating an environment for learning for students. The following are studies conducted on teachers' perceptions of technology.

A study was carried out on 94 science teachers in Western Australia to provide a definition of technology (Rennie, 1987). Results showed that not all teachers were familiar with technology or well versed with technology. It also showed 80% of the 94 sample secondary school science teachers viewed technology as the application of scientific knowledge to do/or make things to fulfil practical purposes. Others made the distinction between knowledge as (science) and its application as (technology) while 21% noted that technology improved the quality of life, or that society benefited from technology as it provided materials and processes or solved problems. The results also revealed that the history of technology was constantly changing and technology was described as having new ideas, being state-of-the-art and becoming part of the lifestyle of tomorrow's world. The study draws a parallel with Scriven (1985 cited in Rennie, 1987) with what was called the history of science which was really a history of technology. Another study were conducted on 142 primary teachers' perceptions of technology in England (Jarvis & Rennie, 1996). Results showed that primary teachers' perceptions of technology varied and ranged from technology as an application of science, to designing and making artifacts. Primary teachers' views on technology as in the National Curriculum and the view of technology as held by society were conflicting. Primary teachers were also confused over the distinction between technology and science which may be detrimental to both subjects.

The study on teachers ideas: technology in the primary school curriculum was also an interesting one (Symington, 1987). The purpose of the study was to explore concepts of technology using 26 items which were believed to fall within the domain of technology and 70 experienced primary teachers were involved. The study showed that teachers' concepts of technology varied and that they held a negative attitude towards technology. To improve their attitude, it was suggested that an appropriate in-service training programme be put in place before curriculum change could begin.

Another study was carried out in Australia with 130 preservice primary teachers who enrolled in a one year postgraduate teachers programme (Ginns, McRobbie & Stein, 2000). The aim of this study was to provide experience that will broaden preservice teachers' perceptions of technology and technology education. The study revealed that personal involvement in an independent technology project provided a richness of experience and understanding of technology for their future teaching roles. This personal and practical participation helped in the understanding of the nature of technology and technological activities. The study reports evidence supporting the value of including independent technology projects in courses, as a way of changing perceptions of technology and technology education for pre-service primary teachers.

In New Zealand 30 teachers (16 primary and 14 secondary) were interviewed on their perceptions of technology education (Jones & Carr, 1992). The following summarized the teachers' views of subjects they taught or disciplines they were trained in: (a) the definition is vague, (b) conflicting information about it, (c) secondary teachers talked about it in terms of artefacts, (d) all teachers felt technology was an interdisciplinary subject, (e) past experience of teachers also influenced the definition of technology education, (f) primary school teachers and intermediate teachers saw it in terms of the subject they taught with computer education. This study gave some direction for the introduction of technology education into the school system.

The studies on teachers' perceptions of technology and technology education provided evidence that teachers' perceptions can influence curriculum development. Teachers' perceptions also had an influence on classroom learning in their role as implementers of the curriculum, while students' perceptions on curriculum also had an influence on curriculum development. The teachers are usually the creators of curriculum materials and their views are important. In Fiji and the Solomon Islands teachers of various subject areas write curriculum material to be used in schools, therefore their perceptions are important. Teachers know the relationship between subject content, teaching and student learning. Students know the learning process. Perceptions of both students and educators in the South Pacific are important for this study for the reasons given and for technology education change. Students' and teachers' perceptions are also important for curriculum development and the education process, as both bring two different perspectives.

- **Summary of Perceptions**

The reasons for studying students' and educators' perceptions in this chapter was based on past research and how these perceptions can influence curriculum change, attitude and response to change, their commitment to curriculum change in developing learning behaviour patterns through their teaching experiences and determining school subject priorities (Ball & Goodson, 1985; Goodson, 1985 Paechter, 1991). Perceptions of students and educators of technology are also important in providing background knowledge for the interpretation of technology and existing knowledge about technology (Jones & Carr, 1992). Students' perceptions of technology, students' classroom activities and students' past experiences are also important because they influence the learning outcomes and curriculum development (Jones, 1997b). If student perceptions are important in these areas, then obtaining perceptions for the purpose of improving learning methods and curriculum development is therefore also important.

Obtaining teachers' perceptions of technology for the purpose of establishing existing views and interpretation of technology is also important. This is vital because teachers' knowledge of technology and past classroom experience can bring a wealth of knowledge and understanding to the decision-making process of what curriculum is best for the future. Studies of teachers' perceptions have also helped in the understanding of attitudes, weaknesses, inclinations, interests and provided a broad understanding of how teachers view technology (Bell & Gilbert, 1994; Jarvis & Rennie, 1996; Jones & Carr, 1992, 1993, 1994). Teachers can influence the curriculum development process and can also influence development of learning theories and teaching practices. Furthermore, teachers with their past experiences can also influence curriculum types at the classroom level, school level and the national level (Jones & Compton, 1998). The reason for studying perception in this research, was to establish a base, a framework and a guideline for the curriculum development process in Fiji and the Solomon Islands.

4.3 CURRICULUM

Discussion of curriculum in this section will cover levels of curriculum, types of curriculum, curriculum views, indigenous curriculum and curriculum change.

- **Levels of Curriculum**

Understanding the various levels of curriculum will help development of perceptions and curriculum change. The notion of level indicates a hierarchial structure. Each level describes position and identity. A typical curriculum scaling consists of five levels namely: national, regional, school, teacher and classroom (Packman, 1996).

The national curriculum is the pinnacle, occupying the top level while the classroom level is at the bottom of the hierarchy. Although segmented on paper, they are seamless and act as one whole unit in reality. The New Zealand 'Seamless Education System' describes a four level curriculum namely: national, regional, schools, and teachers (Butterworth & Butterworth, 1998; Smith, 1993).

National Curriculum

A national curriculum is a framework for implementing education in a country (Moon, 1991) but a national curriculum can also be a means of repression or indoctrination (O'Hear & White, 1993). The reasons for having a national curriculum include the differences between schools, inequality of provisions, raising of standards, improving communication, progress and continuity and individual attainment. The Draft National Curriculum Statement for New Zealand Schools (Department of Education, 1989, p. 5) describes the philosophy of the national curriculum in the following manner:

> At the national level, a national curriculum statement would show, in general terms, what is expected of all schools in New Zealand. It would show the elements that should be present in school programmes, and provide a framework for programme planning.

Moon (1991, p. ix) believes the influence of a national curriculum is significant to any country as described below:

> The national curriculum represents one of the most significant educational reforms of this century. It will have a major influence on schooling and on the work of teachers, governors, parents and employers. The school experience of future generations of young people is being transformed.

The creation of a national curriculum in the UK under the 1989 Education Reform Act (Lawton, 1993) is an example of two curriculum process. The bottom-up model and the top-down model (Ramsay et al, 1997). The latter is the UK model and was described as being bureaucratic rather than professional (Marsh, 1994). The New Zealand National Curriculum also a top-down was developed in 1991, as a direct result of the Education Act 1989 (Smith, 1991). The Australian education system declared a national framework but stated that 'education is the responsibility of the States and Territories.' Marsh (1994, p. 2) explains:

> From the outset it is important to note that under the Australian constitution education is retained as a responsibility of the states. Over recent decades, there has been increasing federal involvement in various aspects and levels of education, but State and Territory Government have continued to be vigilant in preserving States' rights in the area of education.

The 1989 Hobart Declaration presented several guidelines for schooling in Australia, namely: the framework, the principles, the essential learning areas, the essential skills, the objectives and assessment. The New Zealand Curriculum framework consists of principles, essential learning areas, essential skills, national curriculum statements and assessment (O'Conner, 1988; O'Rourke, 1993; Smith, 1991). However, according to Quicke (1999) prior to creating a national curriculum its' goals and purposes needed to be clarified. Moon (1991) heralded the creation of a national curriculum as a significant step forward for the 21th century.

Regional Curriculum

A regional education system is not universal however, some countries practice this system. England, America, Australia, and to some extent Fiji and the Solomon Islands are examples of this. In Australia, the state would be equivalent to a regional area. In Fiji, the term district is used to mean a regional area. Each District Education Officer is in-charge of implementing the national education curriculum policy within their individual districts. In the Solomon Islands, the term provincial is equivalent to regional and a Provincial Education Officer is in-charge of implementing the national education curriculum policy. New Zealand has no regional office but the national education policies are regionalised in schools throughout the country.

School Curriculum

The school curriculum is based on the schools interpretation of the national curriculum. This is often established after consultation with issues relating to the school's approach to education, needs, priority, type of students, facilities and, quality of teachers etc. The New Zealand National Curriculum Draft Statement (O'Conner, 1988, p. 5) explains it well below:

> A school's curriculum shows how a school plans to put into practice the advice of the national curriculum statement. It takes account of local needs, priorities, and resources, and sets out the learning experiences through which students can develop the knowledge, skills, attitudes, and values suggested by the national curriculum. Designing it will involve wide-ranging consultation with the school's community.

The effectiveness in designing the school curriculum is a partnership of four essential groups namely: parents, teachers, principals and the community. By working together jointly, supporting and reinforcing each other, the aims of the school curriculum can be more readily achieved. It is because of the curriculum that schools exist (Golby, 1989).

Teachers' Curriculum

Teachers are the implementers of the National Curriculum. However, all teachers do not have the same interpretation of the National Curriculum. Teachers with years of teaching experience often decide what to teach and how to present subject contents to achieve national goals. Teachers are the decision-makers on teaching methods, subject contents depth and student's learning ability (Hawthorne, 1992).

Classroom Curriculum

Classroom curriculum exists within subjects in the classroom but the tasks and activities may take place within or outside the classroom boundary. These tasks and activities enhance students' learning about technological development and concepts in other countries. The activities may include accessing written and photographic records in the libraries and on databases, examining artefacts in museums, viewing and listening to video and audiotapes with members of the community (Burns, 1997).

- **Types of Curriculum**

Curriculum has been divided into several types according to its purpose and nature. Other curriculum consists of subjects, culture-related areas and activities for learners in schools. Begg (1998) stated that the traditional view of curriculum is very restricted but since then, the curriculum has become more multi-dimensional. This section will discuss the following types of curriculum: academic curriculum, technical curriculum, core curriculum, activity curriculum and hidden curriculum.

Academic Curriculum

The academic curriculum is some times called the core curriculum and it is often compulsory (McGee, 1997). The term academic is synonymous with scholastic, learned, scholarly (Urdang, 1997) which implies that subjects are theoretical with little practical activities. The academic curriculum subjects consist of English, Mathematics, the Science subjects and the Social Sciences. The main purpose for academic curriculum is for the development of academic excellence in students.

Technical Curriculum

The technical curriculum as the name suggests is practical education, based on the principle of learning by doing. It was described by some as a 'watered-down' version of the English Grammer School curriculum which consisted of activities in woodwork and metalwork. The main purpose of the technical curriculum was to prepare students for the working world. The technical curriculum was regarded as being for the less able students (McGee, 1997) but in reality it prepared and equipped students with the appropriate knowledge and skills to enter employment. The international trend now is for the technology education curriculum to be regarded as being equal to other curriculum.

Subject Curriculum

A subject curriculum consists of various subjects which are taught in the classroom. Three main features include: (a) the content is arranged in a logical, sequential order and a flow of thoughts in presentation, (b) the benefits students gained by studying the subjects and learning experience, (c) the teaching and learning activities are channelled into organized field. The teaching and student learning activities are co-ordinated. The curriculum therefore becomes a collection of subjects which may be studied separately or in relation to each other. According to Hargreaves (1989) school subjects can be a weapon of power, prestige, recognition and rewards.

Hidden Curriculum

The Hidden Curriculum is learning things at school other than the formal academic requirements (Harris, 1996). This is where children learn much more about life, themselves and the society in which they live than just learning things written in the curriculum. The curriculum does not explain how schools are organized or the way teachers relate to the students and to each other. It teaches students about the social expectations, moral beliefs and organizational structures of our culture. McGee (1997) called it the unintended curriculum because there is more going on apart from the formal curriculum. Portelli (1993) also described it as the implicit curriculum, the invisible curriculum, the covert curriculum, the unstudied curriculum, and the latent curriculum.

Null Curricula

The term null curriculum was coined by Eisner (1994) and is what schools do not teach (McGee, 1997) but is just as important to the development of a person. Two dimensions of null curriculum were highlighted by Eisner (1994), Newmann (1990) and McGee (1997). The first dimension was the intellectual process which was either emphasised or not emphasised in schools. This intellectual process was the domain of cognitive, affective and psychomotor which the existing curriculum was based on. The intellectual process of the brain also controls speech (left brain) and the visualisation processes (right brain) and if students' performance is to be improved, then these areas have to be emphasised now. Other areas which are becoming more important as society changes include economics, politics, technology, law, legal rights and vernacular arts (McGee, 1997). If these are important then where in the curriculum will they be fitted as the curriculum is already full?

- **Curriculum Views.**

An understanding of different curriculum views will help curriculum developers to be more sensitive to the needs of the people. This is important because culture influences curriculum. Dewey (1900 cited in Tanner, 1991) believed that curriculum is the transmission of culture. Several studies have shown that culture does influence curriculum. The following is a brief description of various views on curriculum.

Multiculturalism

The development of curriculum incorporating many cultural perspectives is known as multiculturalism (this definition is not inclusive). The work undertaken in the field of science education by Aikenhead (1996), Hodson (1993), Jejedi (1997), Krugly-Smolska (1999), Labaree (1998), Michie (1998), Ogunniya (1999) and Pomeroy (1994) illustrated the concept of multiculturalism. Multiculturalists insist that culture plays a role in science learning and cultural studies provide the theoretical framework to carry out work for both westerners and non-westerners. Krugly-Smolska (1999, p. 3) re-affirmed this by saying:

> In this case the concept of culture is actually the theoretical underpinning and interpretive framework that we use for understanding much of what happens in science education.

Worldviewism

Worldviewism is the notion that curriculum development is an international issue. No single country influences curriculum development, it is developed through an international network. Using Science Education as an example, Ogunniyi, Jegede, Ogawa, Yandila and Oladede (1995) argued that science education is based on the wider world view rather then confined to the small world view of individual culture. Cobern (1996) argued that scientific worldview is itself a cultural construct meaning culture determines the outcome. The scientific worldview concept was developed with the notion of science for all, including the community. Chain reaction is the key word here. Hardison, (1989, p. 5) described the chain reaction domino effect notion of 'touch one and the rest tremble' in the statement below:

> What the scientific community must understand about people, is that science along with history, art, language, technology, and religion are pendants on a wonderfully intricate mobile of everyday thought, 'touch one and the rest tremble' and change position in sympathy.

Biculturalism

Biculturalism is a subset of multiculturism therefore, developing a curriculum with the help of another culture within the framework of multiculturism is the process. Biculturism according to Krugly-Smolska (1999) is where one particular cultural group is the dominant minority (Rakow & Bermudez: 1993) which could be better described as bicultural. Krugly-Smolska (1999) argued that even though one or two groups may be dominant, most, if not all classrooms in urban North America are multicultural. Krugley-Smolska (1999) also argued that Hispanic students hide cultural variation within the group.

Cross Culturism

Cross culturism is a view where ideas of one culture can be transferred to another existing culture for the purpose of better understanding of another culture (Aikenhead, 1997; Aikenhead & Jejedi, 1999; Michie, 1998). The same concept has been used by the science curriculum developers to educate American first nation's science students (Cobern, 1996). Negotiating cross-cultural borders for students require expert instruction from teachers to facilitate border crossings by playing the role of tour guide, travel agent, or cultural broker, while sustaining the validity of students' own culturally constructed ways of thinking.

Indigenous Perspective

Indigenous perspective means viewing the curriculum through an indigenous person's eyes. Michie, Anlezark and Uibo (1998) and Michie and Linkson (1999) have presented science curriculum using the perspectives of the Australian Aborigines. They have concepts such as: bush-tucker, dream-time and walk-about which can be very abstract to foreigners. The approaches used to implement primary science education through the Australian Aborigines perspective included:

1. A curriculum which places a higher value on Indigenous knowledge other than simply enriching them with Western science.
2. Resource materials which parallel the experience of indigenous learners with Western understandings, and which are inclusive of Indigenous cultural consideration.
3. An attempt to facilitate profiling of Western science learning outcomes in the context of a holistic Indigenous curriculum.

The study of different views of curriculum is beneficial for curriculum developers because it enables them to be more sensitive to other cultures.

- **Indigenous Curriculum**

The reason for including a section on indigenous curriculum in this chapter was because the introduction of technology education in the South Pacific was seen as being through an indigenous curriculum. This broad based technology education curriculum will contain content which is relevant to the indigenous people of the South Pacific. Some of the impacts of an indigenous curriculum include: (a) regaining identity, (b) preservation of indigenous culture, (c) ownership of curriculum and (d) shaping of future generations. The following describes trends in developing indigenous curriculum internationally. They were not necessarily in technology education but in indigenous curriculum development generally.

First Nations (Native American) Perspective

The indigenous people of North America were referred to as the people of the First Nations (Aikenhead, 1996). They were described as the most disadvantaged minority in North America and are the least represented in science and technology careers (Mathews & Smith, 1991; Nelson-Barbour & Estrin, 1995). Apart from abject poverty, the main issue for them is to gain some control of education (Brady, 1995). During the past 30 years there has been a concerted effort to renew First Nations culture and to gain control and equity in educational opportunities (Battiste & Barman, 1995). First Nations people felt that they must build dignity and respect for themselves by having their own curriculum. In order to achieve this purpose, a science and technology curriculum (Yupiaq science and technology) was established. The advocators for a First Nation curriculum are Aikenhead (1996), Kawagley (1995), Krugly-Smolska (1999), and MacIvor (1995).

Kura Kaupapa Maori Perspective

The history of state schooling for Maori people has been a painful experience (Smith cited in McCulloch, 1992). The colonial government ignored the Maori culture and identity. However, the Treaty of Waitangi of 1840 brought some understanding and co-operation between the two cultures. In 1984, the Maori Educational Development Conference established the Kura Kaupapa Programme (Maori schools) as further support for the ideologies of Kohanga Reo (Maori language immersion programme) and Taha Maori (Maori perspective). The Kura Kaupapa Maori Programme was an attempt to transform the pattern of the past educational experience into one which offered increased success and life chances for Maori people and society (Smith, in McCulloch, 1992). The Kura Kaupapa was in a sense, a Maori Curriculum because Maori culture, knowledge, language, technology, skills, and Maori world-view were expressed, encouraged and taught. The establishment of Te Whariki (Early Childhood Curriculum) by the New Zealand Ministry of Education (1996), was designed specifically to provide a basis for bicultural early childhood education and also to provide an appropriate practice for Kohanga Reo (Maori language immersion) programmes. Prominent advocators for Maori curriculum are McKinley (1996 & 1997) and Smith (1992 & 1999).

Australian Aborigines Curriculum Perspective

The Australian Aborigines are nomads with dream-times, walk-about and a bush-tucker culture. When Australia was colonised by the British, the indigenous people were totally ignored as a people, with no land-rights. The Mabo Court case (Rowse, 1993) was significant, in that it gave recognition to the Aborigines as a people with birth-rights and land-rights. With that recognition and support, a curriculum with an Aborigines' perspective can no longer be ignored. People who have written and who have supported Aborigines' curriculum includes Michie (1998); Michie & Linkson (1999) and Michie, Anlezark and Uibo (1998).

South Pacific Island Countries Perspectives

The history of curriculum development in the South Pacific Island Countries has been through adoption of colonial curriculum (Cakanisiga, 1982; Groves, 1939; Ki'i, 1994; Tavola, 1991). The adoption of outside curriculum was the trend. Due to the lack of expertise locally in curriculum development, many South Pacific countries have not had the chance to express their own perspective in a formal classroom setting. Over the years, several attempts have been made for the development of a more relevant curriculum. The following are some examples for a more localized curriculum. The 'Education for what?' document of the Solomon Islands was an attempt to address the issues of a relevant curriculum (Bugotu, 1972). The Education Reform of Papua New Guinea of 1985 stated that the formal schooling system alienated children from their culture (Ministerial Committee Report, 1986 cited in Tetaga, 1995). The Fiji Islands Education Review Commission 2000 was also very much concerned with its curriculum which stated that the "Fiji education system had grown bigger and ineffective over the years" (Delailomaloma, 2000 Fijilive.com). The Solomon Islands is still not satisfied with its present curriculum and would like to redefine its curriculum to provide 'education for all' through both formal and non-formal education (The Solomon Star, 2000). Tonga has just completed its review of its technical education programme sponsored by AUSAID (1999). Given the exposure to international trends in general education and technological advancement, these trends will continue to have an influence on the South Pacific Countries.

- **Curriculum Change**

Discussion on curriculum change is important for this research because it has implications for curriculum change in the South Pacific.

Pigdon and Woolley (1992) view curriculum change as a process and not an event. Curriculum change is subtracting from an existing syllabus (Wiseman & Pidgeon, 1970). Change means moving away from the traditional. Change occurs in a curriculum, in a classroom and in general school life (Fullan, 1993). Change affects curriculum materials, teaching practices, and beliefs or understanding of curriculum and learning practices. Changes come about in several ways including by chance, by design, through manipulation, or by being imposed. Curriculum change can affect a person's whole life, attitude, work and future career if there is inadequate preparation. The outcome can result in conflict, arguments, protests and rivalries. Implications of curriculum change may involve the loss of a job, anxiety and a struggle to adapt to a new way of life. The theory of curriculum change is a theory of many unanswerable questions because it is all in the future (Fullan, 1993). No one knows exactly for sure what is best. There are however, certain things to keep in mind when dealing with uncertainty which include: prioritizing stages, taking a developmental approach and concentrating on the effort. The effect on others and how to make the process work successfully, should be a priority. Curriculum change also bring about sociological, economical, educational and technological problems. Curriculum change should occur only if the existing one is not productive.

Reasons for curriculum change

Curriculum change is an international trend and the reasons may differ from country to country. Fullan (1993) identified the following things as being likely reasons for curriculum change:

1. Dissatisfaction with the education system.
2. Government's reaction towards an irrelevant education system which does not provide for the needs of the people.
3. As a result of government policy where a new government introduces a new education policy.
4. Tradition could no longer sustain the tide of discontentment and new ideas.
5. Obsolete curriculum contents.
6. Other possible reasons for curriculum change include: growth of population with a range of abilities, interests and demands, demand on educational services for better standards, expectations and aspirations, explosion of information in every course of study, advanced industrial society demands highly skilled labourers, universal trends towards longer school life, earlier physical maturity and new media, new channels of communication which brings new methods and new approaches in their training.

Forces influencing curriculum change

Educational change can be initiated by forces totally independent from the education system. Curriculum change could be as a result of an international initiative instigated through research work or studies carried out in educational areas. These initiatives for curriculum change could also be politically motivated or through people's dissatisfaction which an unproductive educational system. Mosothwane (1995) suggested the following as a source of initiating curriculum change:

1. Government policy - the trend seems to be that every new government which comes into power, wants to implement their own education policy.
2. Professional advancement - new knowledge in educational field normally brings about change in the way educators think.
3. Political system - governments in power want to dictate what they see as being important for the country in education.
4. Education system - discontentment of the population over the education system can force a change in curriculum.
5. Professional organisation - organisations with professional skills and with specific approaches to education can influence curriculum change.
6. Theories of learning - new research findings and the development of new learning theories help in educational change.
7. Textbooks - good textbooks with new ideas and new approaches to the learning process does help in educational change.
8. Clubs - former students clubs and other clubs can be a force and an avenue for curriculum change.

According to Fullan (1993) there are no set rules for curriculum change. He suggested the following as workable rules for curriculum change:

1. Planning for change should be done well in advance of the expected inception of that change.
2. Planning should never be rushed as it takes time.
3. Elaborate forms of organization should not be attempted immediately.
4. Those who will be responsible for the implementation of the change must play a large part in the planning of them.
5. Curriculum innovation should not take place in isolation.
6. Visits will have to be made to other schools.
7. The nature of the changes envisaged should be widely known throughout the school.
8. The planned changes be gradually introduced and monitored.
9. All revision must be related to the over-all design of the curriculum and the facilities of the school.

There are also some disadvantages of curriculum change. History shows the following as likely problem areas: government red-tape, reluctance of acceptance, resistance from certain community groups, resource constraints, funding problems and delivery time. Those who may be affected by curriculum change must recognize change, understand change, accept change, fit into the changing mode and practice change to accommodate their new lifestyle.

Process of curriculum change

The process of curriculum change from an old curriculum to a new curriculum generally takes longer than planned, therefore planning requires great concentration. Change normally goes through several stages. According to Fullan (1993) the process of curriculum change takes four stages: initiation, implementation, continuation and outcome. Then a period of testing and evaluation follows the implementation. Most educators believe the process of curriculum change proceeds through three broad stages. Pigdon and Woolley (1992) summarised them as follows:

1. Adoption, initiation and mobilisation. The initial sign of acceptance of a proposal for change culminates in the decision to undertake change.

2. Initial implementation. This includes the beginning attempts to put the proposal into practice. This is difficult to implement due to resistance to change.

3. Continuation of implementation, maintenance, incorporation or institutionalization. Concerned with sustaining the implementation of the change.

Implementation of curriculum change

The implementation process can be a labourious task, if the reason for change is not well explained and understood by proposers and implementers. Once the mechanism is established and accepted, implementation can be a very quick process. There are certain factors affecting implementation of curriculum change. Fullan (1993) suggests the following categories as a guideline.

1. Characteristics of the innovation or change project - Consist of need, clarity, complexity, quality and practicality. These qualities need to be well understood by people. Delays may arise if there are misunderstanding.

2. Educators - Consists of districts, community, principal and teachers. These educators must be united and work together as a team.

3. External Factors - Consists of government and other agencies. These factors must be included in the implementation process.

Evaluating curriculum change

After implementation, evaluation must take place. Evaluation is a basic management tool in all organisations (O'Hear & White, 1993; Shipman, 1979). One reason for evaluation lies in the relative failure of major programmes, projects and institutions to achieve their aims (Ruddock, 1981). Another reason for evaluating curriculum change is to assess the success rate. Evaluation of curriculum change is necessary to provide information and guidance for decision making (Morris, Fitz-Gibbon & Freeman, 1987). Lawton (1981) views evaluation as the decision on the value or worthiness of a learning process as well as the effectiveness with which it is being carried out. The process of decision making is often the result of evaluating a programme on trial or running. Stufflebeam et al (1971, p. 24), a specialist in the evaluation process, defined evaluation as having dimensions of value and the act of decision-making. He said:

> ... valuation is the process of delineating, obtaining, and providing useful information for judging decision alternatives ... evaluation is defined as the ascertainment of value, and decision, as the act of making up one's mind. The need to make up one's mind connotes the existence of competing alternatives and to select one over the other (s) requires ascertaining their relative values. Hence, evaluation is the process of ascertaining the relative values of competing alternatives.

The process of evaluation, helps identify the specific areas for improvement, and the areas to be improved can be listed.

Problems in coping with curriculum change

The problems of coping with curriculum change can be stressful. Factors such as age, re-training and shifting into new areas can be the reasons for not coping with curriculum change. Fullan (1993) suggested that the best coping strategy consists of "knowing enough about the process of change not to blame ourselves." Curriculum change can also mean the possible use of new materials (instructional resources, technologies), possible use of new teaching approaches (strategies, activities) and possible alteration of beliefs (pedagogical, theories).

- **Curriculum change in the South Pacific Region**

This section will discuss what curriculum change means to the South Pacific region, and what impact it will have on the curriculum and the school system. The South Pacific is part of the technological and economical network therefore, South Pacific educators can no longer ignore curriculum change. New technology will affect learning and the education system in the Pacific Island Countries, so curriculum change is inevitable (McDonald & Ingvarson, 1997). To maintain international links, the South Pacific Countries must be serious about making improvements to its educational standards. The implications and impact of curriculum change in the South Pacific could mean the following things.

Change course title or reinventing subject

The concept of reinventing or reculturing school programmes and school subjects by changing the titles of the programme can create renewed interest in subjects for students (Chubin, 2000). The other reason for change is to create a new atmosphere for the new curriculum therefore, any hint of the old curriculum must be discarded. The new curriculum will be given a fresh start. This approach can be adopted to improve the quality of the existing technical education curriculum in Fiji, the Solomon Islands and the South Pacific Island Countries. Using this approach will create support for the new curriculum.

Up-date content

Up dating content is vital. The existing contents of the technical education curriculum are old, obsolete and past their usefulness. Up-grading contents to meet the demands of technological literacy is the priority. Technology has advanced so much that using old content is an insult to the students of the 21st century.

Improve attitude

The attitude towards technical education is poor and needs improvement. The poor attitude towards technical education is reflected in the school atmosphere, the subjects, the facilities and the system itself. Changing the curriculum will help to change people's attitudes and encourage more support for technical education.

Increase enrolment

Enrolment increases will only happen if course content and course title are changed. This is because students equate course relevancy to the job market. Student's want to be secure in the future, so the new generation of technology education must be attractive to students.

Increase support

The change in curriculum will certainly increase support from the community. The current technical education curriculum in high schools is not popular due to the lack of paid employment available to students after graduation. Parents do not want their sons or daughters to enrol in a programme with no future.

Improve image

The image of the technical education programme has not been good (Martin, 1998). The colonial legacy did not help as they viewed it as a hands-on type curriculum. The fact that school subjects are divided into academic and technical also does not help. Myths such as 'technical education is only good for the academically weak' help to sustain this poor image. To change these images, a change of curriculum is inevitable.

Technology education model curriculum

No technology education model has ever been drawn up for the South Pacific so this will be the first ever. The South Pacific education curriculum has been adopted from other countries in the past, so this curriculum is not relevant to the South Pacific. A South Pacific technology education model curriculum must be based on the needs of the country (Jones & Compton, 1998b; Ramsay et al, 1997).

Training of Technocrats

The South Pacific Island Countries lack technical experts. They need more technical experts to give advice to the governments. Most technical expertise comes from overseas. A technical person from within their own country would be more acceptable to the community because there would be a feeling of belonging and ownership. Technical experts from home countries would also be experts on the local environment and have knowledge of the local perspectives of an indigenous person. Decisions made today will affect future generations.

Preparing Citizens for the 21st Century and beyond

Preparing all citizens for the 21st century and beyond must be the priority for all South Pacific Island governments. Every citizen should be well prepared to live in a technological world. This must be the objective of all countries. A broad-based technology education curriculum will provide the South Pacific Islanders with technological literacy in the following areas:

1. Technological knowledge and understanding – South Pacific Islanders will be knowledgeable in technology.
2. Technological skill and societal value – South Pacific Islanders will be skilled in all technological activities.
3. Technological capability and competence – South Pacific Islanders will be confident and not afraid to communicate with other developed countries.

In planning for curriculum change, the above points should be taken into consideration. Curriculum change in the South Pacific could be influenced by certain political, social, economical and educational organisations, authorities and agencies within the community such as parliament, the Ministry of Education, the Permanent Secretary, the Curriculum Development Unit, urban community, rural community, Teachers' Union and Associations, the Education Review Consultants and Education Review Committees, Non-government Organisations (NGOs), Essential Services, School Committees and School Boards, government, churches, politicians, parents, students and educators (concept adopted from Marsh, 1994, p. 31. See Appendix D for curriculum influencing agencies in the Solomon Islands).

4.4 SUMMARY

This chapter covered two main areas, perception and curriculum, which are important for this research. This study is largely concerned with identifying the perception of students and educators in the South Pacific. The implications of this study include the establishment of a base, a framework and a guideline for the curriculum development process in the South Pacific. From these guidelines an appropriate technology education curriculum can then be established.

The influence perceptions have on curriculum development is important as shown by previous studies conducted on students' perceptions (Burns, 1992; de Vries, 1991; Jarvis & Rennie, 1995, 1996 & 1998; Raat, De Klerk Wolters & de Vries, 1987) and teachers' perceptions (Bell & Gilbert, 1994; Jarvis & Rennie, 1996; Jones & Carr, 1992, 1993 & 1994). Students' and teachers' knowledge of technology and past classroom experiences provide a vital link in identifying areas that need improvement in the curriculum development process. Through an examination of perception, decisions can be made on the directions to be taken in the future. In the case of the South Pacific Island Countries, peoples' perceptions need to be obtained on the existing technical education curriculum for the future direction and development of a technology education curriculum. Without the assistance of students' and educators' perceptions, the curriculum development process would not be genuine and authentic.

Curriculum has many definitions. It can be a government document about what to teach in the classroom, or the total process of learning both in and out of the classroom. For teachers, it is a guideline offering direction. The process of curriculum development varies from country to country. There are two methods which seem to be used: the bottom-up model and the top-down model. The former uses perceptions for direction while the latter is controlled by a few people. There are also internationally held views on curriculum. These views are listed as multiculturism; worldviewism; biculturism; crossculturism and an indigenous perspective. These views represent differences of opinion in curriculum development from people in different countries. The notion of an indigenous curriculum indicates a strong move towards curriculum change for indigenous people. For the South Pacific Island Countries this means a curriculum which is relevant and useful in a technologically advanced world.

This chapter provided background information on perceptions and curriculum. The next chapter (Chapter 5) will discuss research methodology.

CHAPTER 5

RESEARCH METHODOLOGY

The aim of methodology is to help us to understand, in the broadest possible terms, not the products of scientific enquiry but the process itself. Cohen L & Manion L, (1997).

5.1 INTRODUCTION

This chapter outlines the research methodology used in this study. It includes the research tasks, the research types, the research methods, the selection and sampling procedures and the reasons why they were used in this research (Bouma, 2000). The research methodology is a historical report of the events that took place in the course of conducting the research work and how it was conducted. As stated in the previous chapters, the purpose of this research was to collect students' and educators' perceptions of technical education, technology, technology education and traditional technology in Fiji and the Solomon Islands. This data will form a base and guideline for a framework for the curriculum development process in the future.

This research methodology chapter embodies the description of and justification for this research. The chapter is divided into ten sections which explain how this research was conducted. The remainder of this chapter reports on the following:

5.2 Nature of the Research
5.3 Research Data Source
5.4 Data Collection Methods
5.5 Types of Data Collected
5.6 Validity and Reliability
5.7 Data Analysis
5.8 Ethical Consideration
5.9 Problems and Difficulties Encountered
5.10 Summary.

5.2 NATURE OF RESEARCH

This interpretive research used the qualitative and the quantitative methods to collect data. A brief description of the nature of the research is given below.

- **Interpretive Research.**

This research seeks to interpret students' perceptions and educators' perceptions therefore the interpretive method was chosen for this research. The interpretive method is an enquiry into the interpretation of an issue. According to Denzin and Lincoln (1994) interpretation of the data is based on the field work. Banister et al (1994) said that the process of interpretation provides a bridge between the world and us, between our objects and our representation of them, but they also suggested that interpretation should always be viewed as a process. They further suggested that it is a process which continues as our relation to the world keeps changing. Cohen and Manion (1997) said that interpretive research was characterized by a concern for the individual and a focus on the action. This type of research provides an insight into an individual's perspective. Tobin (2000, p. 487) further described interpretive research as an umbrella name for studies aimed at understanding communities, their actions, interactions and perspectives as follows:

> Interpretive research is an umbrella term used to describe studies that endeavour to understand a community in terms of the actions and interactions of the participants, from their own perspectives. Interpretive research seeks to answer broad questions and can address sociocultural factors not accessed easily using other methodologies.

Lather (1992) viewed interpretive research as the understanding of an issue. Lather (1992) illustrated this view with her postpositivist inquiry labeled as Figure 5.1 below, which had four categories namely: predict, understand, emancipate and deconstruct. This study took the view of the second column which highlighted interpretive type research in the 'understand' column.

Figure 5.1: Patti Lather's Paradigms of Postpositivist Inquiry. (Source: Theory into practice, Volume XXXI, Number 2, Spring 1992).

Predict	Understand	Emancipate	Deconstruct
positivism	interpretive naturalistic constructivist phenomenological hermeneutic symbolic interaction microethnography	critical neo-Marxist feminist race-specific praxis-orient Freirean participatory	post-structural postmodern post-paradigmatic diaspora

Cohen and Manion (1997) further said that interpretive research was also useful in understanding the reality of the data at one time and in one place, and then comparing it with what goes on in a different time and place. They went a step further to describe an interpretive researcher as an individual who sets out to understand the world around him/her. Therefore the objective of this research was to understand the perceptions of students and educators of Fiji and the Solomon Islands. Cohen and Manion's (1997) perspective and characteristics of interpretative research includes small-scale research, human actions continuously recreating social life, interpreting the specific and understanding actions/meanings rather than causes. Interpretive research can either be qualitative or quantitative in nature.

- **Qualitative Research**

Creswell (1994) stated that qualitative research is (a) of an exploratory nature, (b) variables unknown, (c) context important and, (d) may lack a theory base for study. Qualitative research is interpretive in practice and in nature and has no single methodology. According to Denzin and Lincoln (1994) qualitative research is difficult to clearly define because it has no theory, or paradigm, that is distinctly its own. Qualitative research is interdisciplinary, transdisciplinary, and sometimes counterdisciplinary. Furthermore, Denzin and Lincoln (1994) acknowledged that qualitative research is a field of inquiry it its own right. It crosscuts disciplines, fields, and subject matter. A complex, interconnected family of terms, concepts, and assumptions surround the term qualitative research. All of these research practices "can provide important insights and knowledge" (Nelson et al, 1992 cited in Denzin & Lincoln, 1994). Banister et al (1994) said that although qualitative research is now widely used, defining qualitative research is still under debate. This was supported by Denzin and Lincoln (1994, p. ix) when they said that the 'field' of qualitative research is far from a unified set of principles advocated by networked groups of scholar. They saw the dilemma of defining qualitative research shown in this statement:

> In fact, we have discovered that the field of qualitative research is defined primarily by a series of essential tensions, contradictions, and hestitation.

Despite this disunity in definition, Banister et al (1994) suggest the following points to help clarify the nature of qualitative research: (a) it is an attempt to capture the sense that lies within, and this structures what we say about what we do, (b) it is an exploration, elaboration and systematization of the significance of an identified phenomenon and, (c) it is the illuminative representation of the meaning of a delimited issue or problem. A common feature of qualitative research is in the method of collecting and interpreting of data. Qualitative research focuses on the comprehension of information rather than reaching a conclusion. Having an understanding of the data is the main concern of the research rather than drawing an immediate conclusion. Bouma (2000) stated that qualitative research is designed (a) to provide an impression, (b) to tell what kinds or types of something there are and (c), to tell what it is like to be, do or think something. Its' emphasis is on finding out what is going on out there. According to Bouma (2000), the aim of qualitative research is to describe in detail what is happening in a group, in a conversation, or in a community, who spoke to whom, with what message, with what feelings and with what effect. According to Banister et al (1994), qualitative research is the interpretive study of a specific problem in which the researcher is central to the sense that is made, because the researcher decides the destiny of the research work. Maykut and Morehouse (1999) further stated that qualitative research is the examination and the description of people's words and actions as truly experienced by participants. The goal of qualitative research is to discover patterns which emerge after close observation, careful documentation, and thoughtful analysis of the research topic. They further viewed qualitative as a hands-on experience with data analysis as central in research work. They believe that data analysis may well be the 'heart' of qualitative research. A further feature of qualitative research was the method of using a human-as-instrument method in identifying problems or defining a situation.

Qualitative type research was said to be useful in collecting, classifying, categorizing, synthesizing, evaluating and interpreting raw data (Cohen & Manion, 1997). Several methods are used to collect data in qualitative research and the most common ones include surveys, interviews, questionnaires, case studies, observations and note-taking. This study used the interview method, using questions to accomplish its mission as described by Patton (1990, p. 278) in the statement given below:

> Go forth now. Go forth and question. Ask and listen. The world is just beginning to open up to you. Each person you question can take you into a new part of the world. For the person who is willing to ask and listen, the world will always be new. The skilled questioner and the attentive listener knows how to enter into another's experience.

Concerning the role of the researcher, Maykut and Morehouse (1999) stated that one common goal for all qualitative researchers was to understand more about a phenomenon of interest. A key feature of qualitative research is that it tends to produce vast amounts of information, which then needs to be summarized. According to Hollway and Jefferson (2000) four questions which are generally associated with analysing any qualitative data are as follows: (a) what do we notice?, (b) why do we notice what we notice?, (c) how can we interpret what we notice and (d) how can we know our interpretation is the 'right' one? In order to obtain an understanding of students' and educators' perceptions, the face-to-face interview method was used in this research.

- **Quantitative Research**

Creswell (1994) viewed quantitative research as traditional, the positivist, the experimental, or the empiricist. He further highlighted some of the features of quantitative research as (a) an area previously studied by other researchers so that a body of literature exists, (b) known variables and (c) existing theories. Quantitative research is statistical in nature and is designed to give a numerical result, thus it was proved to be useful in this research. Quantitative research emphasizes the measurement and analysis of casual relationships between variables, not processes. It is commonly applied where statistics, tables, graphs and charts are reported and provides information about the number of something, the proportion of something, or what the trends are (Bouma, 2000). Quantitative research is also of a correlational and experimental type research which requires relatively large and carefully selected samples of individuals. According to Birley and Moreland (1998) qualitative research also looks not at the difference between two (or more) groups, but at the relationship between two (or more) variables. In this study the population samples were the students and educators. In correlational research, the researcher treats the sample and setting differently from their normal environment while in experimental research, the choices of sample conditions tend to be within the realm of common experience. According to Jaeger (1997) quantitative approaches generally include sampling of both individuals and situations in ways that attempt to minimize the generalisation of the findings to the widest possible population. According to Bouma (2000) a key difference between qualitative and quantitative research is that in quantitative research, a great deal of effort goes into the preparation of questionnaires, setting up of experiments or selecting groups to compare. Traditional schools such as science, mathematics etc still debate the issue that quantitative research is scientific and professional while qualitative research is not (Bouma, 2000). However, Denzin and Lincoln (1994) argued that this type of view could not be supported due to the cross-cultural nature of research work internationally. In support of both research methods, Bouma (2000, p. 175) had this to say:

> Both qualitative and quantitative approaches are absolutely essential to research process in social sciences. Both require some common and some different skills. Neither approach sets the standards for the other, as they each have their own rules of practice and require various disciplines of the researcher. Neither is easier than the other, nor is one approach more creative than the other.

In this interpretive research, both types of methods were used namely, qualitative and quantitative as they are all useful for this research. The above descriptions of interpretive, qualitative and quantitative research summed up the nature of this research work. These research methods will provide a useful framework to answer the five research questions for this study:

1. What are students' perceptions of technical education, technology and traditional technology in Fiji and the Solomon Islands?
2. What are educators' perceptions of technical education, technology, technology education, and traditional technology in Fiji and the Solomon Islands?
3. Does the existing technical education curriculum meet the needs and aspirations of students and educators in Fiji and the Solomon Islands?
4. How can the findings of this research inform the curriculum development process in the South Pacific?
5. What are the implications of this research for the development of technology education curriculum in the South Pacific?

5.3 RESEARCH DATA SOURCE

This section will discuss how data was sourced, where it was obtained from and also explain how these sources were selected for this research. The sources for information include: participants, secondary schools, the national curriculum unit, the church education department, the national archives, the government research unit and the libraries.

- **Participants**

Students and educators were the main participants for this study because people are the most important information source for research (Lane, Chisholm & Mateer, 2000). The selection and sampling of the educators as participants was made by the researcher. However, the selection and sampling of students were made in consultation with the principals of each school who liaised with the class teachers to prepare certain students for the interview. Selection of students was based on the following criteria: (a) students should be from classes between Forms 2-6, (b) students should be from both technical and other subject areas such as science or arts and (c), students should be from both genders. The criteria for the selection of educators for the interview was based on (a) experience in school administration, (b) experience in curriculum development, (c) those who were in the implementation of the curriculum in schools and (d) those who had experience in technical subjects. The educators interviewed were selected by the researcher and this was done randomly with institutions and departments which had a connection with technical education. All participants selected were either citizens of Fiji or the Solomon Islands.

In Fiji, 100 participants were selected for the interview, while 60 were selected for the interview in the Solomon Islands making a total of 160 participants. Student participants were from eight secondary schools, four in Fiji and four in the Solomon Islands. Educators were from schools and from the national curriculum development unit. The table below shows the statistical data gathered in the field.

Table 5.1: Statistical data gathered in Fiji and the Solomon Islands

Particulars	Schools	Students	Educators	Total Participants
Fiji	4	60	40	100
Solomon Islands	4	40	20	60
Total	8	100	60	160

- **Secondary Schools**

The selection of the secondary schools for this research was decided by the researcher. The selection of schools in both Fiji and the Solomon Islands was based on four factors: (a) accessibility, (b) co-educational schools, (c) schools' offering of technical subjects and (d) either rural/urban. Eight schools were selected based on these criteria and visited (See Table 5.1 for school profile). All schools visited in both countries were co-educational and offered technical subjects. In most schools, subjects were streamed and gendered, for example industrial arts was only for male students while home economics was only for female students. In some schools, subjects were open to all students. All the schools were classified as urban because they are accessible by road and sea although some are located in rural areas. Students, teachers and principals of these schools were interviewed.

- **The National Curriculum Centres**

The Curriculum Centre in both Fiji and the Solomon Islands is where the curriculum development is undertaken. However, in Fiji the technical section of the curriculum unit is located in another separate building of the Ministry of Education. The curriculum unit is where curriculum materials are prepared, printed and dispatched to all the schools throughout the country. All documents concerning curriculum development are available at this centre. The decision to visit the curriculum unit was made by the researcher in order to interview the curriculum developers. The interviews with curriculum developers were conducted in their respective offices.

- **The Churches Education Department**

The influence of the various churches on education was the reason for visiting the Church Education Departments in both Fiji and the Solomon Islands (See Chapter 2). The selection of churches was based on the Churches which influenced the development of education (Chapter 2, p. 16; p. 29). Based on that criteria in Fiji, the researcher visited the Education Department of the Catholic Church, the Anglican Church, the Methodist Church and the Seventh-day Adventist Church. In the Solomon Islands the researcher visited the Department of Education of the Catholic Church, the Anglican Church, the Methodist Church, the Seventh-day Adventist Church and the South Seas Evangelical Church. In both countries, the visits were disappointing because none of them had records of their history in education work. However, the information on the churches' role in education development was made available at the archives of both Fiji and the Solomon Islands.

- **The National Archives**

The reason for choosing the archives (Fiji Archives & Solomon Islands Archives) for this research was that it holds documents concerning the past history of both Fiji and the Solomon Islands. The archive provided information on church history, the colonial government, development of education and the impact of education on the lifestyle of the indigenous people of both Fiji and the Solomon Islands. It also provided demography, pictures, statistics, previous research work and other information required by the researcher for this study. The archives of both countries made a significant contribution to this research concerning information on church influences and the role in shaping the direction of educational development in the past for the future.

- **The Government Research Unit**

The reason for visiting the Government Research Unit was to obtain permission to conduct field research work and to collect information (See Appendix G). The purpose of the research unit in both Fiji and the Solomon Islands is (a) to issue research permits, (b) to control research work conducted in the country, (c) to document and store information and (d) to conduct, monitor and direct research work. The 'Research Unit' is part of the Ministry of Education in both countries and is based within the Ministry of Education. For this research, the research unit provided past educational documents, consultative reports, statistical data on education, economic impacts on education and conference papers. In Fiji, the research centre was located in Quality and Marela House (Ministry of Education) while in the Solomon Islands it is based in the Anthony Saru Building (Ministry of Education).

- **The Solomon Islands National Library and the University of the South Pacific Library**

Other useful information for this research was made available from the Public Library of the Solomon Islands based in Honiara and the University of the South Pacific Library in Fiji based in Suva and this was the reason for visiting these two libraries. The National Library of the Solomon Islands provided specific information concerning early pioneering work in education by the various churches, in particular in the Solomon Islands. The University of the South Pacific's library provided information written by academics on curriculum development and further information on the history of the churches and their role in educating indigenous South Pacific Islanders. Both libraries were important as they provided useful resources for collecting data for this research work. According to Lane, Chisholm and Mateer (2000) information from libraries consists of data that have been organised for the potential benefit of individuals.

5.4 DATA COLLECTION METHODS

According to Birley and Moreland (1998) the data collection part of a research project is where many researchers feel the real research occurs. They further suggested that data collection is not just a process of collection, it is also a process of creation, of using information in unique ways related to the purpose of the study. Lane et al (2000) described data as facts and figures, based on observation, surveys or research, that has been collected and is available for use. This section discusses how the data were collected and describes the methods adopted to collect data for this research. The main methods of collecting data on perceptions was through a face-to-face interview. This section will also discuss the interview as a research tool, the interview schedule and the recording of the interviews for this research.

- **The Interview as a Research Tool**

Since the interview was the main tool of collecting data for this study, a brief discussion on the interview as a research tool is necessary for background information.

The purpose of the interview varies widely but according to Cohen and Manion (1997) the main purpose of an interview may include the following:

1. Used as a means of evaluating or assessing a person in some respect;
2. For selecting or promoting an employee;
3. For effecting therapeutic change, as in the psychiatric interview;
4. For testing or developing hypotheses;
5. For gathering data, as in surveys or experimental situations;
6. For sampling respondents' opinions, as in doorstep interview;

The interview method was used in this study because of its many advantages. According to Jaeger (1997) the advantages of face-to-face interviews are as follows:

1. The opportunity to clarify respondents' answers by asking additional questions and to provide information to respondents;
2. An interviewer who actually sees the person being interviewed can secure additional information through observation;
3. By watching body language, an interviewer sometimes can tell whether or not the respondent understands the question being asked, is willing to respond, and has more to say if encouraged to do so;
4. Rates of cooperation in face-to-face interviews are usually higher than those secured through any other methods;
5. In a social survey, the type and condition of the respondents' housing is often an important factor that can be assessed by looking at neighbourhoods and dwellings.

According to Blaxter et al (1998), Hansen (1995) and Rowland (2000), the interview method involves questioning or discussing issues with people. As a research technique, the interview may serve three purposes: firstly, it may be used as the principal means of gathering information as it provides access to what is inside a person's head (Tuckman 1972); secondly, the interview may be used to test hypothesis or to suggest new ones; or as an explanatory device to help identify variables and relationships; and finally, the interview may be used in conjunction with other methods in a research undertaking. Cannell and Kahn (1968, p. 271) defined an interview as 'a two-person conversation initiated by the interviewer for the specific purpose of obtaining research-relevant information.' Keats (1993) said that interviewing is part of the day-to-day activities of a wide range of occupations, especially those concerned with service to people. There is no one answer from participants in an interview because each participant in an interview will define the situation in a particular way (Kitwood, 1977). It is therefore important that each individual must be allowed to express their views freely. Banister, Burman, Parker, Taylor and Tindall (1994) suggested four ways for conducting an interview which could help justify the usage of the interview in this research work, as follows:

1. Interviews are concerned with participants' own interpretations of the interview topic rather than responding according to a standard format to compare with other individuals or groups;
2. Interviews permit exploration of issues that may be too complex to investigate through quantitative means;
3. Interviews are a benefit-rewarding method in research involvement and practice. This mean that conducting interviews demands mutual respect and the researcher and participants playing an active role;
4. Interviews demand some responsibility on how the interview is conducted. The researcher has to be more assertive to indicate who is in-charge and decide who is to be interviewed thus fulfilling the purpose of the interview conversation.

Some of the approaches used to conduct interviews as suggested by Banister et al (1994) as stated above were relevant and useful to this research. Cohen and Manion (1997) suggested four types of interviews which could be useful as research tools such as the structured interview, the unstructured interview, the non-directive interview and the focused interview. May (1996) also suggested four types of interviews and listed them as structured, unstructured, semi-structured and group interviews. This research used the structured interview and the unstructured interview methods. The reason being for flexibility and freedom of expression. According to Lane, Chisholm and Mateer (2000) one final piece of advice to the researcher was to always be prepared. They further qualify their statement with the following: (a) be prepared with background on the topic, (b) be prepared with background on the interviewee, (c) be prepared for note-taking, (d) be prepared with equipment, (e) be prepared for getting there, (f) be prepared for the interview, (g) be prepared during the interview, (h) be prepared for the follow-up and (i) check back with the interviewee if there is anything that needs clarification.

- **The Interview Schedule**

The main method of collecting data on perceptions for this study was using the face-to-face interview method. The interview schedule for this research began with the preparation of the two sets of questions, one for students and one for educators. The students' questions covered aspects of perceptions including: subject choice and students' questions covered aspects of perceptions including: subject choice and students' reasons for subject choice, perceptions of technical education, perceptions of technology and perceptions of traditional technology. The educators' questions covered the following aspects: perception of the existing technical education curriculum, perception of technology, perception of technology education and perception of traditional technology. Prior to the actual field work in Fiji and the Solomon Islands, the two sets of questions were used in a trial interview on Fiji and Solomon Islands students studying at the University of Waikato. After the trial interview, the two sets of questions were then modified, refined and were ready to be implemented during the research field work in Fiji and the Solomon Islands (See Appendix E for the interview questions).

The interview schedule was arranged by the researcher with the various education authorities. The researcher made appointments by contacting the various principals by phone at each school and meeting with the individual principals to arrange an interview schedule and the number of participants required. This was only done after permission was obtained by the Ministry of Education and the various church authorities (See Appendix G for Consent Letters). With the government owned schools, the researcher went through the Ministry of Education to contact schools. With private schools (church, organisation and community schools) the researcher went through the appropriate education authority (See section 5.7 on ethical considerations). The interviews were conducted with individual students and educators. With students, an atmosphere of calmness was first created by the researcher by talking about other things to build trust. This approach was also endorsed by Birley and Moreland (1998) when suggesting that an interview should be conducted in a relaxed but businesslike manner, with respondents being put at ease, and the intention of the interview clarified. In the junior classes students talked less compared with students of the senior levels. In some cases the questions were not well understood by junior students, so the researcher had to offer further explanations. Students' interviewed were from different subject majors and not necessarily from technical subjects (See Chapter 6 & 8). As for the educators' interviews, all the interviews were conducted at the educators' work place (office, school). A common characteristic about the interview with educators was that they had so much to talk about (See Chapter 7 & Chapter 9). Educators interviewed were from different subject areas which gave a variety of perceptions on technical education, technology, technology education and traditional technology. No disruption was encountered during the interviews of either the students or educators. The interviews were conducted effectively and efficiently with trust and cordial respect. The average time frame for each interview of participants was 30 minutes. The interview schedule for this research was successful because the co-operation received from the two host countries was very good.

- **The Recording of the Interview**

In this research, all the interviews were recorded by a portable audio-cassette tape recorder machine. These interviews were later transcribed and analysed (See Section 5.6: Data Analysis). Although recording interviews is the conventional method in academic research, the decision to use the tape recorder for this research was made by the researcher because it was the best and most appropriate method for this research. There were many reasons why tape recordings were used.

The following were views from several authors concerning the usage of an audio-cassette recorder to record interviews. According to Birley and Moreland (1998) tape-recorded data (a) needs to be made available to others for analysis and (b) prompts (additional questions) can made available during interview. Blaxter et al (1998) stated that tape recording helped the interviewer to concentrate on the process of the interview with focus and attention (eye-contact) on the interviewee. In this way, the whole verbatim of the interview is recorded. May (1996) favoured tape recording of interviews for the following reasons: (a) it assists interpretation as it allows the interviewer to concentrate on the conversation and record the non-verbal gestures of the interviewee during the interview, (b) once the conversation is started, many people forget the tape is on, (c) editing the tapes according to theoretical categories in which the analyst is interested, assists in the comparative analysis of the interview responses and (d) tape recording guards against interviewers substituting their own words for those of the person being interviewed.

In essence, Bouma (2000) viewed the tape recording of the interview as an interaction record where the interviewer interacts with the interviewee. Bouma (2000) suggested that the compilation of an interaction record of an interview could provide answers to question such as: Who spoke? Who spoke how much? Who displayed what emotions?

Who made what kind of argument? Who agreed/disagreed? Was there a point at which the decision was made? During the field work of this research, the issues raised by the various authors concerning recording of the interviews were experienced.

5.5 TYPES OF DATA COLLECTED

This section discusses the types of data collected during this research. According to Blaxter, Hughes and Tight (1998), data collected during research varies considerably in their characteristics, which was true in this research. The following were types of data collected for this study:

- **Participants' data**

Data concerning the participants is described in this section. The two main participant groups used in this research were the students and the educators. Given below is the break-down of students' and educators' data. Table 5.2 below shows a break-down of Fiji students classes at each Form level and the numbers of students selected and interviewed to gain their perceptions on technology.

Table 5.2: Fiji students interviewed according to high school level.

Levels in high school (Fiji)	Male	Female	Total (N = 60)	Percentage (%)
Form 1	0	0	0	0
Form 2	3	2	5	8.3%
Form 3	6	4	10	16.6%
Form 4	7	5	12	20%
Form 5	9	6	15	25%
Form 6	10	8	18	30%
Total	**35**	**25**	**60**	**100**

Table 5.2 shows the number of students from Forms 2-6 selected for the interview. The majority of students selected for the interview for their perception of technology were from the senior levels because older students had a better understanding of the questions. Only a small percentage of students from the junior levels were interviewed for their perceptions. The majority of the students interviewed came from the two main ethnic groups from Fiji namely, the indigenous Fijians and the Fiji Indians. However, those interviewed were also from other ethnic groups such as Rotumans, Rambians, Chinese, Europeans and others. The focus of this study was to obtain an overall perception of students from Fiji and not perceptions of the different ethnic groups. A total of 60 students were interviewed in Fiji.

Table 5.3 below shows the categories of educators interviewed in Fiji for their perceptions.

Table 5.3: The categories of educators from Fiji interviewed for their perceptions.

Types of Educators	Male	Female	Total (N = 40)	Percentage (%)
High School Teachers	12	10	22	55%
Tertiary Teachers	5	5	10	25%
Principals	4	0	4	10%
Curriculum Developers	2	2	4	10%
Total	**25**	**15**	**40**	**100**

Table 5.3 above shows the number of educators interviewed in Fiji. It shows the four main categories of educators interviewed namely, high school teachers, tertiary teachers, principals and curriculum developers. Again the two main ethnic groups were the indigenous Fijian and the Fiji Indians but other ethnic groups were also interviewed such as Chinese and the Rotumans etc. Again an overall perception of educators from Fiji was required and not perceptions of the various ethnic groups. A total of 40 educators were interviewed in Fiji.

Table 5.4 below shows the number of the Solomon Islands students interviewed and their class level at high school.

Table 5.4: Solomon Islands students interviewed according to their level at high school.

Levels in high school (Solomon Islands)	Male	Female	Total (N = 40)	Percentage (%)
Form 1	0	0	0	0
Form 2	3	2	5	12.5%
Form 3	5	3	8	20%
Form 4	8	4	12	30%
Form 5	10	5	15	37.5%
Form 6	0	0	0	0
Total	**26**	**14**	**40**	**100**

Table 5.4 above showed the number of Solomon Islands students interviewed for their perception of technology. As in Fiji, most students interviewed were senior students (Forms 2 to Form 5) because they understood the questions better. There were no Form 6 students interviewed because by October, Form 6 classes had ended their academic year. Form 6 normally sit their Solomon Island School Certificate early in September and by October they have gone to their various homes. A total of 40 students were interviewed in the Solomon Islands.

Table 5.5 below shows a break-down of Solomon Islands educators interviewed for their perceptions of technology.

Table 5.5: shows categories of educators from the Solomon Islands.

Types of Educators	Male	Female	Total (N = 20)	Percentage (%)
High School Teachers	4	4	8	40%
Tertiary Teachers	2	2	4	20%
Principals	3	1	4	20%
Curriculum Developers	2	2	4	20%
Total	**12**	**8**	**20**	**100**

Table 5.5 above shows the total number of Solomon Islands educators interviewed for their perception of technology. There were more teachers interviewed than principals and curriculum developers. A total of 20 educators were interviewed in the Solomon Islands.

- **Perceptions' data**

The focus of this study was to obtain data on perceptions held by students and educators in Fiji and the Solomon Islands on technical education, technology education and traditional. A description of their perception is given as follows:

Students' perceptions

Students' perceptions were obtained from both Fiji and the Solomon Islands on issues concerning subject choice and reasons for their subject choice. They were also interviewed on their perceptions of technical education, perception of technology and perception on traditional technology. (See Chapter 6 and Chapter 8 for sample answers from students and educators in Fiji).

Educators' perceptions

Educators' perceptions were obtained from both Fiji and the Solomon Islands on issues concerning perception of the existing technical education curriculum, perception of technology, perception of technology education and finally perception on traditional technology. (See Chapter 7 and Chapter 9 for sample answers from students and educators from the Solomon Islands).

- **Historical data**

The churches were responsible for the introduction of education in both Fiji and the Solomon Islands (Tavola, 1991; Tippett, 1967), therefore historical data was required to gain a better perspective of education over the years. It was also important to review the role the colonial government played in educating Fijians and the Solomon

Islanders (Groves, 1939; Tavola, 1991). To introduce a new type of curriculum, a history of the existing curriculum was necessary.

- **Country data**

Data concerning the countries this study focused on was also important therefore in both of Fiji and the Solomon Islands contemporary data was collected. This was necessary to understand how education affected the human resources and economy of the country and what the future forecast of both countries may be.

- **Educational data**

Educational data includes: education report documents, consultant reports, education review reports, conference papers, historical reports, policy papers and workshop reports. Several government educational documents from both Fiji and the Solomon Islands influenced the direction of education. The following are some examples: in Fiji, six education policy documents influenced the direction of education in Fiji and they are as follows: (a) Colony Education Policy Paper, 1896; (b) Government Ordinance, 1916; (c) Fiji Education Commission, 1969; (d) Education Act - Laws of Fiji, Chapter 262: Education, 1978; (e) Education Fiji 2020, 1998 and (f) Fiji Education Review Commission 2000.

In the Solomon Islands, seven education policy reports influenced the direction of education as follows: (a) Groves Report, April 11, 1939 - Report on a survey of education in the British Solomon Islands Protectorate; (b) Searle Report, August 1970, Education in the BSIP: History and Structure; (c) Education for what? Report, 1972; (d) Morke Report, 1965; (e) Carswell Report, 1966; (f) Gailer Report, 1967 and (g) Education for who? Report, 1989. These educational documents provided valuable information for this research on the development of the education system in both Fiji and the Solomon Islands.

- **Technical education curriculum data**

The curriculum data for this research work was obtained from technical education in relation to general education in both countries. Specific information was obtained from the national curriculum, school curriculum, classroom curriculum, teachers' curriculum and students' curriculum. All the above curricula gave a true picture of the current education system of each country.

- **School profile data**

Eight schools were visited in both Fiji and the Solomon Islands. Each school is identified by a number. In Fiji the schools were numbered as (1-4) while in the Solomon Islands schools were numbered (5-8). A summary table of each school is shown in Figure 5.2 below:

Figure 5.2: A summary of schools visited by researcher during field research work.

Fiji Secondary Schools (No 1-4)	Solomon Islands Secondary Schools (No 5-8)
Background to School 1 Urban, state owned, co-educational secondary, day students, student roll approximately 1000, mixed ethnicity of students and staff, modest academic and discipline standards, offered both academic and technical subjects, relaxed social atmosphere, unrestricted interaction between sexes, informal relationship between staff and students, no dominant cultural or religion orientation, offered technical subjects.	**Background to School 5** Urban, government owned, co-educational boarding school, student roll approximately 600, staff with Solomon Islanders, mixed ethic students, modest academic and discipline standard, students recruited from the other national school at Form 6, well equipped since it is a government school, produces most of the government employees and well supported by the government, offered technical subjects.
Background to School 2 Urban, state owned, co-educational secondary, day students, student roll approximately 800, mixed ethnicity but Indian students dominant, very high academic and discipline standard, offer technical and academic subjects, study atmosphere with high expectation of pass rate , restriction relationship between sexes, very formal staff and student relationship, no dominant religion, offered technical education.	**Background to School 6** Urban, municipal authority owned and operated, day secondary school, student roll approximately 400, multi-racial and co-educational, moderate academic and discipline standard, enjoyed a good range of well qualified staff, adequate facilities, offered technical subjects.
Background to School 3 Urban (outer island), day secondary school, state owned, co-educational, student roll approximately 400, mixed ethnicity, modest academic and discipline standard, restricted interaction between sexes, formal relationship between staff and students, Fijian dominate staff, facilities needs improving, religious value up-held, students from surrounding villages, students from low socio-economy background, offered technical education.	**Background to School 7** Semi-urban, church owned and operated, boarding, co-educational, student roll approximately 400, Christian education emphasized, restricted interaction between sexes, mostly Solomon Islands staff, self sufficient through small cottage industries, students predominantly Solomon Islanders, high disciples standard, offered technical education.
Background to School 4 Semi-rural, state owned, boarding secondary with vocational school, predominantly Fijian male, student roll approximately 900, Fijian staff, modest academic and discipline standard, Fijian tradition & culture emphasized, sports oriented, self sufficient in root crops, facilities needs improving, Christian principles up-held, students from middle to lower socio-economic background, offered technical and academic subjects, a vocational school attached.	**Background to School 8** Semi-urban, church owned and operated, co-educational boarding school, religious, student roll approximately 350, Christian principles up-held, self sufficient, restricted interaction between sexes, high discipline standard, Solomon Islands staff, mostly Solomon Islands students and offered technical subjects.

5.6 VALIDITY AND RELIABILITY

In this section the issue of validity and reliability for this research will be discussed. The discussion in this section should be read in conjunction with the information found in Section 5.4: Data Collection Methods and the information given in Section 5.7: Data Analysis. The issue of 'respondent validation' (member checks) was also discussed in this section where participants responses were returned to the respondents (students and educators) to validate (confirm that the response content are true and correct) thus ensuring validity and reliability of data collected. The process of respondent validation for this research was conducted in 1998 (second field trip).

- **Validity**

The issue of validity for this research concerns the intruments used to measure what it purports to measure (Cohen, Manion & Morrison, 2000). In this research the instrument used to collect students' perceptions and educators' perceptions was the interview. Validity of the interviews relates to the quality and accuracy of the questions asked, the quality and accuracy of the respodents' responses, the quality and accuracy of recording of the responses, and the quality and accuracy of interpretation of the responses.

According to Brinberg and McGrath (1985) the word validity has to do with truth, strength, value and is not a commodity that can be purchased with techniques. They further stated that it is liken to integrity, character, or quality which can be assessed relative to purposes and circumstances. The only time, according to Bouma (2000), when the issue of validity is raised in research work is when researchers feel dissatisfied with the instrument used, how it was implemented and the results. Miller and Dingwall (1997) further described validity with words such as authenticity, plasticity and integrity. For its importance in the research process Bainbridge (1992, p. 461) described validity in the following manner:

> Validity is the quality of a measure that measures the phenomenon it purports to measure. ...the validity of a measure has to do with how well it operationalizes an abstract concept.

Cohen et al (2000, p. 105-106) listed several different kinds of validity for example (a) content validity, (b) criterion-related validity, (c) construct validity, (d) internal validity, (e) external validity, (f) concurrent validity, (g) face validity, (h) jury validity, (i) predictive validity, (j) consequential validity, (k) systemic validity, (l) catalytic, (m) ecological validity, (n) cultural validity, (o) descriptive validity, (p) interpretive validity, (q) theoretical validity and (r) evaluative validity. This research falls into the category of content validity and interpretive validity. Content validity because the instrument must show that it fairly and comprehensively covers the domain or items that it purportes to cover (Cohen et al, 2000) and interpretive validity because the responses were interpreted.

To ensure validity in the elements of research plan, data acquisition, data processing analysis, interpretation and its ensuing judgement (Cohen, Manion & Morrison, 2000, pp. 115-116) the following points needed to be considered:

1. Choosing an appropriate time scale.
2. Ensuring that there are adequate resources for the required research to be undertaken.
3. Selecting an appropriate methodology for answering the research questions.
4. Selecting appropriate instrumentation for gathering the type of data required.
5. Using an appropriate sample (e.g. one which is representative, not too small or too large).
6. Demonstrating internal, external, content, concurrent and construct validity; 'operationalising,' the constructs fairly.
7. Ensuring reliability in terms of stability (consistency, equivalence, split-half analysis of test material).
8. Selecting appropriate foci to answer the research question.
9. Devising and using appropriate instruments; ensuring that readability levels are appropriate; avoid any ambiguity of instructions; using instruments that will catch the complexity of issues; avoid leading questions; ensuring that the level of test is appropriate; avoiding test items with little discriminability; avoiding making the instruments too short or too long; avoiding too many or too few items for each issues.
10. Avoiding a biased choice of researcher or research team (e.g. insiders or outsiders as researchers).

To ensure validity in the elements of this study the following process (steps) was followed:

1. The planning and preparation of questionnaire was carried out in consultation with supervisors (See p.104 and Appendix E (1) and Appendix (2).
2. The questionnaire was trialed with Fiji and Solomon Islands students and educators studying at the University of Waikato (See p. 104). Questions were asked from many angles to ensure true and valid answers.
11. The refinement of questionnaires in consultation with supervisors (See p. 104).
12. The selection of fieldwork countries (Fiji & Solomon Islands), scheduling (1997 & 1998), participants (students & educators) and, how to collect data (taped & recorded) in consultation with supervisors (See pp. 101-106). The focus was on the overall perception of students and educators and not perceptions of each ethnic group. The process of respondent validation (content of participant's responses sent back to them) took place in 1998 of second field trip (See p. 120).

13. The analysis of data was by a 7-step process with consultation of supervisors (See pp. 115-120) as follows:

    Step1- Transcribing participants responses tapes. In the case of Solomon Islands difficulty was encountered in understanding English therefore the questions were asked in pidgin iglis and students responded in pidging iglis. During transcribing the researcher had to interpret Solomon Islands student's responses from pidgin iglis back to English which took longer than normal.
    Step 2- Combining individual responses under same question (See p. 115).
    Step 3- Coding of participants responses. (See pp. 116-117).
    Step4- Categorization of responses into themes. These themes were the researchers own invention (See p. 114 & p. 117; Chapter 6, 7, 8, & 9).
    Step 5- Construction of tables according to themes (See Chapter 6, 7, 8, & 9).
    Step 6- Selection of appropriate quotes to support themes (See p. 118).
    Step 7- Interpretation of responses from tables (See p. 118; Chapter 6, 7, 8, & 9).

These are the steps taken to ensure validity and reliability of this research process. A brief discussion of reliability and summary is discussed next.

- **Reliability**

According to Brewer and Hunter (1989) a reliable measure reports consistent readings of unchanging social situations – no matter who uses the measure and irrespective of either minor variations in technique or chance fluctuations in the circumstances of measurement. In other words, a reliable measure is free from the influence of random errors. Hence, reliability may be tested either by comparing the findings from repeated applications of precisely the same measure in slightly different circumstances or by comparing the results obtained in the same circumstances using measures which are highly similar in their techniques.

For this research the question to ask therefore is, if I did the same research at a later date in a similar situation will I get the same result? A point of reliability for this research work was that the interviews were conducted (a) on different days, (b) at different times, (c) in different schools, (d) with a range of people and (e) was conducted in two different countries. This research process is evidence of the reliability of this research work. According to Bainbridge (1992) reliability is the quality of a measure that gives consistent result. A reliable questionnaire item tends to get the same response if administered twice, so long as the relevant circumstances have not changed. According to Bouma (2000) honesty and accuracy will safeguard reliability of the research process. Therefore if we are disciplined and accurate in our reporting of research findings, then this increases the reliability of the research process. Honesty and accuracy therefore should be a characteristics of any intellectual enterprise, and requires a degree of self-control. Bouma (2000) further stated that research is useful only to the extent that the researchers have been disciplined, accurate and honest. Reliability for this research was fulfilled in the research procedure as recorded and described in pages 101-106 and pages 115-118. Reliability and validity, though related, are not the same thing (Bainbridge, 1992) as shown in this discussion. According to Brewer and Hunter (1989) the general rule in validation is that if two measures really do point to the same phenomenon, then their reading should agree.

- **Summary**

Validity and reliability was enhanced in this study as follows:

1. A good representation sample of students and educators participants (160) were interviewed for this study.
2. The focus of the interview was to obtain an overall perceptions of students and educators and not perceptions of individual ethnic groupings.
3. The semi-structured interview allowed probing of questions from different angles but all students and educators were asked the same questions.
4. The cultural and ethnicity factors of participants' perceptions were unique and original for this research.
5. The researcher as an insider was crucial to understanding the comments and getting information from wide range of people from Fiji and the Solomon Islands.
6. The usage of own language (pidgin iglis in the case of Solomon Islands) made it possible for researcher to interpret, understand respondent responses and cross checked responses.
7. The respondent validation was implemented in both Fiji and the Solomon Islands during 1998.
8. At all time during the study the researcher was always conscience of the ethical considerations of research protocol.

The above points strengthen the case of validity and reliability for this study.

5.7 DATA ANALYSIS

According to Birley and Moreland (1998) data analysis, along with data collection, is the real essence of the research process. The analysis of the interview uses three processes, namely interaction, transcription and interpretation (May, 1996). Data collection method has been discussed under Section 5.4. This section describes the procedures used in the analysis of the data. This analysis procedure also helps to address and justify the five research questions for this study (See p. 98).

- **Transcribing of the interview responses**

The responses of the participants were taped on to a cassette using a tape recorder and were then transcribed (See Section 5.4). A dictaphone was used to transcribe all the 35 cassettes. Each tape was 90 minutes long and it took an average of 3 days to complete one tape. In the Solomon Islands understanding the questions was a difficulty therefore the questions were translated into pidgin iglis. Student respond in pidgin iglis. When transcribing the tapes the interviewer had to translate the pidgin iglis responses into English therefore it took longer to complete transcribing the tapes than normal. For the 35 tapes it took 105 days (15 weeks) to complete and over 1, 050 hours (based on 10hrs transcribing per day). All the interviews were conducted in English (See Chapter 6, 7, 8 and Chapter 9 for students' and educators' answers).

- **Combining of the participants' responses under the same question**

After the transcribing was completed, all students' and educators' responses were written under each question. The purpose of compiling all the answers under the same question was to make it easier for the researcher when coding, as the answers were already written under the question. In doing so, the numbering of each response to the same questions will follow the normal counting system sequence for example 1, 2, 3, 4 etc. An example of the question and the answers on technology are given below:

Question: What does technology mean to you?

Answers: *It is learning about modern technology for example, learning about computer is technology to me and other science subjects. They bring the future very close to me (FJ'Steno'F1).*

When I think of technology I think of computers (FJ'Steno'F2).

When I hear the word 'technology' I immediately think of new machines (FJ'Tech/Sc'F4).

- **Coding of participants' responses**

Coding is the process of assigning a symbol as a shorthand way of summarizing a completed questions responses (Birley & Moreland, 1998). Bouma (1996) viewed coding as giving the data a descriptive label. To ensure anonymity of the participants in this research, a coding system (pseudonyms) was devised based on (a) country of origin, (b) subject major, (c) sex and (d) sequential order of interviewee as interviewed. Ethnicity is not an issue in this research. The coding system consisted of letters and numbers (or a mixture of both) which specifically identified that particular participant. In some cases with student participants, the number of letters increased indicating the number of subjects a student took. The application of the coding system was the same in both countries except that they had a different country code. The following are two examples of the coding system used to identify students' quotes and educators' quotes.

> *Invention of new machines and every thing. Bringing in more advanced things rather than sticking to the old ways (FJ'HE'F7)*
>
> *As I said previously there is a need for a revision of the technical curriculum. Traditional technologies should form the base knowledge and building on that should be the latest in technology. I suggest a review committee be set up to review the whole technical education curriculum (SI'IA'M20).*

A student participant was given this code (FJ'HE'F7). Decoding it means each part has to be identified and interpreted separately as follows:

The parenthesis example, () symbolizes completeness of the coding system. The parenthesis identify a specific participant from all others from the same country: (FJ'HE'F7), (SI'IA'M20)

The second two letters (upper case) are combined and indicates the country of origin example, FJ = Fiji, SI = Solomon Islands

The third symbol is an apostrophe example ' enclosing the student subject major. The other apostrophe example ' comes after the subject name for example: 'HE'

The fourth word within the apostrophe ' indicates students' subject major. Each student identifies themselves with a particular subject which they see as leading to a possible future career for example: 'HE' = Home Economics, 'Sc = Science', 'FN = Food and Nutrition, 'Tech/Sc' = Technology & Science, 'IA' = Industrial Arts

The fifth letter after the apostrophe indicates gender type. The participant is either male or female: M = Male, F = Female

The last number indicates the sequential order of participants interviewed for example, 7 = seventh person interviewed or 20 = twentieth person interviewed.

In this research, the coding system helped to identify the individual participant to the researcher and keep the identity of the participant confidential as required by the research ethics. This notion was supported by Birley and Moreland (1998) when stating that the purpose of coding is (a) to render the data into a form in which it can be presented and analysed, (b) to identify any important and significant trends that may be present and (c) to allow the researcher to get to know their data. They further stated that coding is the process of structuring data into an analysable form.

- **Categorising of the participants' responses into themes**

After coding, the next step was to identify themes according to the responses of students and educators. Identifying themes can be difficult but it can be overcome by focusing on the main message of the responses for example, the theme for the response on technology would be artefacts (See Table 6.11, Chapter 6). In this research 'artefacts' means machines, vehicles, planes, boats, computers etc.

> *It is learning about modern technology for example, learning about computer is technology to me and other science subjects. They bring the future very close to me (FJ'Steno'F1).*

The themes that were derived from the particpants responses were the invention of the researcher based on the trends of students' and educators' perceptions in Fiji and the Solomon Islands.

- **Construction of Tables from Themes**

The construction of tables was dictated by the number of themes derived from students' and educators' perceptions. The number of themes created depended on the various messages or trends highlighted by the students' perceptions and educators' perceptions. Two examples of different levels of themes in a given table are given below:

Table 5. 6: Students' influences for future career.

Career influence	**Students** M	**Students** F	**Total** N = 60	**Percentage** (%)
Own Decision	29	16	45	75%
Other's Influences *(parents & relatives)*	6	9	15	25%
Total	**35**	**25**	**60**	**100%**

Table 5. 7: Other things students would like to learn at school.

Other things student like to learn at school	Students M	Students F	Total N = 60	Percentage (%)
Computing	10	7	17	28%
Engineering & Technology Related Subjects *(electronics, aircraft, wood technology, architecture, drawing, machines, designing, interior decoration, sewing, cooking)*	7	5	12	20%
Sport & Music	6	4	10	17%
Culture *(custom, tradition, family, anthropology, success in life)*	4	5	9	15%
Science *(biology, anatomy, planet, environment, related areas)*	5	3	8	13%
Others *(business, secretarial, agriculture, mathematics)*	3	2	5	8%
Total	**35**	**25**	**60**	**100%**

- **Selection of Quotes to Support Themes**

The selection of quotes was made for three reasons (a) as evidence of participants' responses, (b) to match the themes indicated in the tables and, (c) to support the theme. The selection of quotes was carefully chosen in view of each theme. An example (See Table 6.7) of a quote supporting the theme 'computing' is given below:

> *I would like to learn computing because the way things are going I think computers will be important in the future (FJ'Sc'M13)*

- **Interpretations of participants responses from Tables**

The interpretation of responses can be a difficult process if the meaning of the quote is not properly understood. The researcher's interpretation of the quotes and themes gave meaning to the statistical data. Reading meaning into all the quotes was important in this research work (See Appendix F for Summary of Research Findings).

5.8 ETHICAL CONSIDERATIONS

Ethics are also important for this research. Respecting the rights of the participants and having their informed consent, must be utmost in the researcher's mind as highlighted by Bouma (1996, p. 193) in this statement:

> In conduct of research, the investigator must at all times respect the personality, rights, wishes, beliefs, consent and freedom of the individual subject.

The informed consent to conduct research in both Fiji and the Solomon Islands for this research was obtained from the Ministry of Education. This research was guided by the Centre for Science, Mathematics and Technology Education Research Student Guideline 1997, Waikato University, New Zealand. According to McBurney (2001,

p. 56), the American Psychological Association (APA) 1992 guidelines also echoed a similar concern on ethics by requiring researchers to:

> Enter into an agreement with participants that clarifies the nature of the research and the responsibilities of each party.

Bibby (1997, p. 115) further viewed the code of ethics of the Australian Association for Research in Education (AARE) as guides and providing protection to both researchers and the participants as stated below:

> It is intended to guide the behaviour of members, and to protect them against unacceptable demands and pressures from superordinates and sponsoring institutions.

According to Lane, Chisholm and Mateer (2000) the researcher is obliged to release the following personal research information to the school authorities: (a) who you are, (b) where you are from, (c) what information you need, (d) what you plan to do with the information and (e) when you need the information.

- **Ethical Statement (The University of Waikato)**

In fulfillment of the University of Waikato Human Research Ethics Committee Regulations for post graduate studies, the researcher submitted an ethical statement with a research proposal in 1997. The ethical statement application (form ver.1.1.1997) and the research proposal were approved in July 1997. The researcher conducted this field work only after the approval was obtained from the Ethics Committee of the University of Waikato. The preparation for both the ethical statement application and the research proposal took the researcher six months. The ethical statement form consisted of ten sections. The most important sections pertaining to ethics were section 4 and section 5. Section 4 was on ethical concerns which included: (a) access to participants, (b) informed consent, (c) confidentiality, (d) potential harm to participants, (e) participants' right to decline, (f) arrangements for participants to receive information, (g) use of the information, (h) conflict of interests, and (i) other ethical concerns relevant to the research. Section 5 was concerning legal issues on (a) copyright, (b) ownership of data or materials produced and (c) any other legal issues relevant to the research. All the above issues were fulfilled as required by the University of Waikato Human Resource Ethics Committee Regulations guidelines.

- **Permission to Conduct Field Research Work (Fiji and the Solomon Islands)**

As legally required in both Fiji and the Solomon Islands, all researchers must obtain permission from the Ministry of Education prior to any field research work (See

Research Unit, p.101). In keeping in line with this regulation, the researcher applied for permission from both the Government of Fiji and the Solomon Islands, to conduct face-to-face interviews. In the case of Fiji, the researcher wrote to the Permanent Secretary of education and permission was granted by a letter, dated 06 March 1997. In the Solomon Islands, the researcher applied for a research permit (Form-R.B) from the research unit and permission was granted on 03 July 1997 by the Minister of Education (See Appendix G for letters and documents concerning approval to conduct research in Fiji and the Solomon Islands). In both Fiji and the Solomon Islands, permission to conduct research was granted by the Ministry of Education. In this research, the principals of the schools were informed and it was the researcher who made contact with individual principals' to arrange interview schedules. The same procedures were also followed to inform educators of the interview schedules.

The first field work in Fiji was conducted between August to September, 1997 however due to unforeseen circumstances, the field work had to be post-poned and resumed on December 1997 to February 1998. The follow-up field work was conducted between September to October 1998. The purpose of the follow-up visit was to collect other relevant data not collected previously, and for participants to check the transcripts of the interviews from the first field work. For the Solomon Islands, the first field work was conducted during the periods of October and November of 1997. The follow-up field work was carried out between November to December 1998.

5.9 PROBLEMS AND DIFFICULTIES ENCOUNTERED

This section discusses the problems and limitations encountered in the research particularly during the field work in both Fiji and the Solomon Islands.

- **Communication Difficulty**

Communication difficulty was experienced by the researcher during the field work. The junior students (Form 2 & 3) in the Solomon Islands had difficulty understanding a few questions, so the questions had to be translated into Pidgin Iglis. When this was done the question was well understood. English was the second language for Solomon Islands students therefore this difficulty was expected by the researcher. In Fiji this was not a problem.

- **Non-Reply Practice**

A non-reply to letters was a problem experienced by the researcher in both Fiji and the Solomon Islands. On several occasions letters sent out by the researcher requesting information was never acknowledged by the addressee. Although this was a minor issue, it was very frustrating for the researcher. This non-reply phenomenon delayed the progress of the research work.

- **Distances to Schools**

In both Fiji and the Solomon Islands distance was a factor, because schools were scattered and it took time to get to each school, although schools were accessible by road or sea. Travelling from one school to another also took time, so to minimize travelling time the researcher had to spend a week each in two schools. Another problem concerning distance was the unreliable bus and shipping services to these places. Buses breaking-down, waiting for spare parts and the repairing of broken-down boat engines were just part of the lifestyle in the outer islands. Transport difficulties delayed the progress of research work.

- **Participants Avoiding Being Interviewed**

As a standard practice, the researcher always made appointments prior to interviews. However, on several occasions these appointments were never kept by those who had agreed to be interviewed. An appointment was made for the interview. At the appointment date, the researcher arrived on time and at the appointed place for the interview but the participant was not present. The researcher waited for half an hour and seeing no sign of the participant, the researcher left. The first instance the researcher took this as being forgetfulness, but after repeated non-attendance, the participants clearly did not want to be interviewed. A non-attendance was a diplomatic way of withdrawing from the interview.

- **Research Work versus Cultural Norms**

Traditional culture and the western academic protocol were not always compatible but many times they complemented each other. The researcher planned to transcribe all the participants responses each night after the interview, but this was not possible due to cultural commitments. A part of the research work was to find out more about the people and spending the nights talking to the local people was a good way of knowing the people. As was expected by tradition, the researcher was obliged to respond by sitting down with relatives or friends to share a cup of tea or a plate of food. This practice may not be the ideal academic research protocol but this was necessary as a way of showing appreciation for being part of the community and being allowed to interview the people. Refusing such gestures would send the wrong signal to the community. In the researcher's case, culture and work did not clash, they complemented each other. These were some of the problems, difficulties and limitations encountered during the research field work.

5.10 SUMMARY

A methodology is the historical story or list of events of how a piece of research was conducted from the beginning to completion. Some authors (Mather, 1995) have argued that methodology is concerned with informing the readers of the procedures undertaken, while the methods are the way in which information was collected. Still others (Harding, 1987) argued that methodology is the theory of knowledge which guides the research work, while methods are the techniques used for gathering information.

The three key types of research used in this research were interpretive, qualitative and quantitative. The interpretive method brings out the meaning of the data under investigation. The qualitative method was mainly concerned with the quality of the data under investigation and understanding the data. The quantitative method was concerned with numeracy, statistical data and tables. The main methods of collecting data for this research was the face-to-face interviewing of participants. Data sources included: schools, national curriculum units, the church education departments, the archives, the education research centres and the national libraries. The types of data collected included: participants' data, perception data, historical data, country data, educational data, technical education data and school data. The data analysis adopted was the interpretive type as this was the most acceptable for this qualitative and quantitative research. As is necessary in all research, permission was obtained from the Ministry of Education from both Fiji and the Solomon Islands.

This chapter described the research methodology for this research. The next four chapters (Chapter 6, 7, 8 and Chapter 9) will provide an analysis and interpretation of students' and educators' perceptions of technical education, technology, technology education and traditional technology in Fiji and the Solomon Islands.

CHAPTER 6

STUDENTS' PERCEPTIONS OF TECHNICAL EDUCATION, TECHNOLOGY AND TRADITIONAL TECHNOLOGY IN FIJI

The aspirations of the students surveyed offer clear insight into the way the students perceive their future. Helen Tavola, (1991).

6.1 INTRODUCTION

The previous chapters have provided background information on Fiji and the Solomon Islands. These chapters have established the basis for Chapters 6 and 7 regarding students' and educators' perceptions of technology in Fiji, while Chapters 8 and 9 cover students' and educators' perceptions of technology in the Solomon Islands.

This chapter focuses on students' perceptions of technology in Fiji. Students' perceptions were obtained from interviews (see chapter 5). Students interviewed were from Form 2-6. Tavola (1991), stated that obtaining students' perceptions is necessary as they can tell us a lot about themselves. Getting them to tell us what interests them can help us design a useful curriculum. The interview sample of students for this chapter is N = 60 of which 35 were males and 25 were females.

This chapter is divided into six sections which describes students' perceptions on technology. The remainder of this chapter reports on:

- 6.2 Subject Choice and Students' Reasons for Subject Choice.
- 6.3 Perceptions of Technical Education.
- 6.4 Perceptions of Technology.
- 6.5 Perceptions of Traditional Technology.
- 6.6 Summary of Findings

6.2 SUBJECT CHOICE AND STUDENTS' REASONS FOR SUBJECT CHOICE

This section covers subject choice, reasons for subject choice, career choice, subject choice in preparation for a future career; usefulness of subject choice to future career, career influence and other things students would like to learn at school.

- **Subject choice (subjects students took at high school)**

Table 6.1 outlines the high school subjects that the sample of interviewed students enrolled in, and is only used here for the purpose of providing background information on the students.

Table 6.1: A list of subjects students took at high school in Fiji.

Subject Choice	Students M	Students F	Total N = 60	Percentage (100%)
English	35	25	60	100%
Maths	33	22	55	92%
Physics	25	9	34	57%
Chemistry	16	15	31	52%
Technical Drawing	25	5	30	50%
Biology	6	9	15	25%
Food & Nutrition	1	8	9	15%
Industrial Arts (woodwork/metalwork)	9	0	9	15%
Agriculture	8	0	8	13%
Social Science	7	0	7	12%
Computing	1	4	5	8%
Introduction of Technology	5	0	5	8%
Geography	0	4	4	7%
Economics	0	4	4	7%
Engineering Technology	4	0	4	7%
Home Economics (food/clothing/textile)	4	0	4	7%
Accounting	0	3	3	5%
Stenography/Office practice	0	3	3	5%
Subject Choice	**M**	**F**	**60**	**100%**

Subjects students enrolled in at high school were by their own choice and these choices were influenced by their future careers. English has 100% enrolment rating while, although Maths was compulsory, it was not taken by all students. The science subjects (physics, chemistry and biology) were highly rated by students who were interviewed. Technical drawing also has a high enrolment rate because it is a prerequisite for the Technology degree offered at the University of the South Pacific. The technical subjects (home economics, technology, agriculture) are streamed, gendered and have fewer students studying them. The next section will discuss reasons for students' subject choice.

- **Reasons for subject choice**

Table 6.2 highlighted the reasons for students' subject choices in high school

Table 6. 2: Students' reasons for enrolling in certain subjects at high school.

Reasons for subject choice	**Students M**	**Students F**	**Total N = 60**	**Percentage (%)**
Future Career	33	22	55	92%
Interest *(Useful & Beneficial in Life)*	2	3	5	8%
Total	**35**	**25**	**60**	**100%**

Students gave many reasons for choosing a specific subject, however subject choices can be divided into two main categories; for their future career (92%) and for interest (8%). The following quotes illustrate the reasons given by students regarding their subject choices:

> *I am doing these (subjects) to help me in my future career (FJ'HE'F24)*

> *I need those subjects to become what I want to be in my life (FJ'Phy'F33)*

> *In Form 5 I decided to continue on to do computer science at the university level so I chose these subjects that were required (FJ'Tech/Sc'F4)*

> *Because I want to achieve my target for my future career (FJ'Sc'M39)*

> *Because I plan to work in a field that is concerned with technology (FJ'Tech/Sc'M5)*

Interest (8%) in a subject was another reason for subject choice. This is illustrated in the quote given below:

> *Because they are interesting and useful in life (FJ'Tech/Maths'M10)*

The next section will discuss students' choice of future careers such as becoming a doctor, a teacher or a pilot.

- **Career choice**

Table 6.3 below highlights students' proposed future careers after leaving school.

Table 6. 3: Students' proposed career choice.

Career choice	Students M	Students F	Total N = 60	Percentage (%)
Engineering *(chemical, aircraft, mechanical, structural, civil, electronic, aviation)*	21	6	27	45%
Medicine *(doctor, nurse, dentist, pharmacist, laboratory technician)*	6	7	13	22%
Service Industry *(hotel, accountant, secretary)*	1	7	8	13%
Teaching Profession *(lecturer)*	3	4	7	12%
Architect & Builder	4	1	5	8%
Total	**35**	**25**	**60**	**100%**

Forty-five percent of students listed engineering as their future career choice because there is a need for engineers in the country as supported by the quote given below:

> *I wanted to be an engineer due to the constant need for engineers here in Fiji (FJ'Sc'M45).*

Medicine (22%) was chosen as a future career because it is generally a well paid job which means a stable income and status in a family as illustrated in the quote given:

> *I want to become a doctor because I want to serve my country and my people and because it is a prestigious well paid job in Fiji (FJ'Sc'M47).*

Tourism is Fiji's second most important service industry and this is reflected in 13% of students' responses. A typical student quote supporting tourism in the hotel industry is given below:

> *I would like to work in hotels because I am interested in that kind of work (FJ'HE'F8).*

Teaching (12%) has always been regarded as a respectable profession in Fiji therefore it was also a choice for a future career as illustrated with this quote:

> *I want to get a masters degree and become a teacher. I chose teaching because I want to teach students what I have learnt, that is, the good things, to help students be better citizens (FJ'FN'F16).*

Architecture and building (8%) were chosen as careers because students liked to design and learn about building as illustrated by this students' quote below:

> *I'd like to be an architect because I like to deal with buildings (FJ'Tech'M44)*

The next section will discuss students' perceptions of subject choice in preparation for their future careers.

- **Subject choice in preparation for a future career**

Table 6.4 identified students' perceptions on subject choice and their ability to prepare themselves for their future careers.

Table 6. 4: Students' views on subject choice as preparing them for future career.

Subject choice in preparation for a future career	Students M	Students F	Total N = 60	Percentage (%)
Yes *(subject choice does prepares them for future career)*	32	23	55	92%
No *(Only to certain extent)*	3	2	5	8%
Total	**35**	**25**	**60**	**100%**

Most students (92%) said subjects taken at high school prepare them for a future career. The courses prepare them to continue on to the next level of study. It also establishes a solid foundation for their future career as supported by the quote given:

> *Yes, because mechanical engineering requires subject such as maths, physics and chemistry so I think it does (FJ'Sc'F4).*

Only 8% of students answered the following: no, to an extent and unsure, as illustrated in the quote given below:

> *Not what I expected for my future career (FJ'IA'M59)*

The next section will describe student's perceptions on the usefulness of subject choice to future career.

- **Usefulness of subject choice to a future career**

Table 6.5 shows the usefulness of subject choices to students future careers.

Table 6. 5: Students' views on the usefulness of subject choice to their future career.

Usefulness of subject choice to a future career	Students M	Students F	Total N = 60	Percentage (%)
Useful *(meeting people needs)*	31	24	55	92%
Not Useful	4	1	5	8%
Total	**35**	**25**	**60**	**100%**

Most students (92%) said subjects they took at high school will be useful to their future career because it allows them to continue on to the next level and will broaden their knowledge for their future career, as illustrated in the quote given below:

> *It's useful to me because the qualifications I have gained in high school will help me to get my career (FJ'Tech/Sc'M49)*

Only 8% of students said it is not useful because they are undecided as yet on what their future career will be as explained in the quote below:

> *At the moment I can't see the full picture on how useful it is but so far, I've been going out and helping out on a few projects. So far it has been good (FJ'Tech/Sc'M53)*

The next section will discuss who influences the students in making decisions for future career.

- **Career Influence**

Table 6.6 highlights the influences on students for their future career choices.

Table 6. 6: Students' influences for future career.

Career influence	Students M	Students F	Total N = 60	Percentage (%)
Own Decision	29	16	45	75%
Other's Influences *(parents & relatives)*	6	9	15	25%
Total	**35**	**25**	**60**	**100%**

Most students (75%) said they made their own decisions on their future career. A typical quote supporting a student making their own decision is given below:

> *I made it myself (FJ'Tech/Sc'M6)*
> *I made my own decision (FJ'Tech'M41)*

Twenty-five percent of students said that they depended on their parents and relatives to help them make decisions for their future career as illustrated in the quote given below:

> *My parents helped me to select what subjects to take but the final decision was mine (FJ'Tech/Sc'F51)*
> *My grandfather helped me in deciding (FJ'IA'M59)*

The next section will describe other things students would like to learn at school.

- **Other things students would like to learn at school**

Table 6.7 identified other things students would like to learn at school.

Table 6. 7: Other things students would like to learn at school.

Other things student like to learn at school	Students M	Students F	Total N = 60	Percentage (%)
Computing	10	7	17	28%
Engineering & Technology Related Subjects *(electronics, aircraft, wood technology, architecture, drawing, machines, designing, interior decoration, sewing, cooking)*	7	5	12	20%
Sport & Music	6	4	10	17%
Culture *(custom, tradition, family, anthropology, success in life)*	4	5	9	15%
Science *(biology, anatomy, planet, environment, related areas)*	5	3	8	13%
Others *(business, secretarial, agriculture, mathematics)*	3	2	5	8%
Total	**35**	**25**	**60**	**100%**

This table indicates that students were interested in many areas. Twenty-nine percent selected computing because it is perceived as important today and in the future as illustrated by the quote given below:

> *I would like to learn computing because the way things are going I think computers will be important in the future (FJ'Sc'M13)*

Many engineering and technology related areas (20%) were selected by students because they relate to their studies and are more practical as illustrated by this student's quote given below:

> *I like to study the practical aspects of technology because most of the things we do are theory. I like to go out in the field and see how they actually work (FJ'Tech/Sc'M5)*

Music and sports (17%) were chosen because students wanted to learn something different as illustrated in the student's quote given below:

> *I think I like to learn music because it is totally different from what I am doing (FJ'Phy'M32)*

Culture (15%) was important to students because they believe that their culture will disappear if they do not learn it now, due to the western influence as illustrated by the quote indicated below:

> *My culture and tradition because many young Fijians are loosing their culture (FJ'FN'F15)*

Studying science subjects (13%) is important because science students can gain more in-depth knowledge about science as stated by this quote given below:

As a science student I really like to learn more about science as a subject (FJ'Steno'F10)

Eight percent of students showed an interest in business, secretarial studies, agriculture and mathematics. A typical quotes is given below:

I want to learn business studies and accounting because they will help me with my future business plan (FJ'Ag'M35).

The next section will cover students' perceptions of technical education.

6.3 PERCEPTIONS OF TECHNICAL EDUCATION

This section covers a comparison of technical subjects with other subjects; popularity of technical subjects and relevance of technical education.

- **Comparison of technical subjects with other school subjects**

In table 6.8, students made a comparison of technical subjects with other high school subjects.

Table 6. 8: Students comparison of technical subjects with other school subject.

Comparison of technical subjects with other school subjects	**Students M**	**F**	**Total N = 60**	**Percentage (%)**
Important & useful but needing improvement	23	18	41	68%
Not Emphasized *(lacks facilities & equipment)*	10	6	16	27%
Needs Revision	2	1	3	5%
Total	**35**	**25**	**60**	**100%**

Sixty-eight percent of students said technical subjects are important and useful because Fiji is a developing country and needs more qualified technical people. The notion of the existing technical education curriculum needing improvement is illustrated by the quote given below:

Technical subjects are important and useful, for example, engineering subjects, but I think it needs improvement. (FJ'Tech/Sc'F4)

Other students said technical subjects are not emphasized (27%) because they lack support and funding for equipment as illustrated in the quote given below:

I think it is not emphasized. We do not have the resources to understand the technical concepts. In Fiji, we depend mostly on books and theory and that is why I am saying it is not making much progress (FJ'Sc'F28)

Students specifically said technical subjects need revision (5%) to keep up with the latest technology as described in the quote given below:

Technical subjects need reviewing to keep up with the latest technology which is part of our every day life today (FJ'IA'M60)

The next section will cover the popularity level of technical subjects as perceived by the students.

- **Level of interest of students in existing technical subjects in high school**

Table 6.9 highlights students' perceptions on the levels of interest in technical subjects in Fiji.

Table 6. 9: Students' perceived level of interest in technical subjects in Fiji high schools.

Level of interest in technical subjects.	Student M	Student F	Total N = 60	Percentage (%)
Yes, Interested In.	24	16	40	67%
No, Not Interested In.	11	9	20	33%
Total	**35**	**25**	**60**	**100%**

Students said technical subjects are popular (67%) and important because they helped them to move on to the next level at school as illustrated by this student quote below:

Yes it is popular because most students who are now in Form 7 took technical subjects since Form 3 (FJ'Sec'F3).

Thirty-three percent of students said technical subjects were not popular because other subjects were considered more important as illustrated in the quotes given below:

Not really because students put more emphasis on other subjects (FJ'HE'F22)

No because most student go for arts and are not involved in technology subject (FJ'Steno'F1).

Its worth noting that traditional Fijian culture places a high value on practical activities.

The next section will cover the perceived relevance of the existing technical curriculum.

- **Perceived relevance of the existing technical curriculum**

Table 6.10 shows students' perceptions on the relevance of the existing curriculum.

Table 6. 10: Students' perceptions on relevance of existing technical curriculum.

Perceived relevance of the existing technical curriculum	Students M	F	Total N = 60	Percentage (%)
Relevant	33	24	57	95%
Not Relevant	2	1	3	5%
Total	**35**	**25**	**60**	**100%**

The existing technical curriculum was perceived as relevant (95%) because Fiji as a developing country needs more trained technical people to manage and sustain its resources as illustrated by this student's quote given below:

> *It is relevant because our country is a developing nation. We need more trained technical people to develop our resources (FJ'Tech'M9).*

Five percent of students said the existing technical curriculum is not relevant because it is out of date as illustrated in the quote given below:

> *Not all technical subjects are relevant because some are out-of-date and need up-grading (FJ'IA'M60)*

The next section will deal with student's perceptions of technology.

6.4 PERCEPTIONS OF TECHNOLOGY

This section covers students' perceptions of technology, examples of things students consider to be technology, reasons for choosing technology, reasons for liking technological things, kinds of technology students would like to learn at school, kinds of technology that younger children would be interested in learning at school and perceptions of doing technology at school.

- **Perceptions of technology**

Table 6.11 shows students' perceptions of technology

Table 6. 11: A summary showing Fiji students' perceptions of the term technology

Perceptions of technology	**Students M**	**F**	**Total N = 60**	**Percentage (%)**
[1]Artefacts *(machines, computer, trucks, aircraft, buildings)*	13	7	20	33%
[2]Recent Phenomenon *(new, modern, advance, inventions)*	7	9	16	27%
[3]Improved Efficiency *(easier, advance, good, work better)*	7	3	10	17%
Application & Techniques *(construction, approach)*	5	4	9	15%
Problem Solving *(involved, knowing)*	3	2	5	8%
Total	**35**	**25**	**60**	**100%**

Students' perceptions of technology varied. Thirty-three percent of students viewed technology as artefacts such as machinery and machine related things. A typical quote supporting this view is given below:

> *It is the physical things we see like trucks, cars, planes and computers (FJ'IA'M60)*

Technology is also viewed as a recent phenomenon (27%) describing technology as new, the latest thing and having new inventions. A quote supporting this is given below:

> *Invention of new machines and every thing. Bringing in more advanced things rather than sticking to the old ways (FJ'HE'F7).*

---

[1] Artefacts means machines, vehicles, planes, boats, computers, electrical equipment etc.

[2] Recent phenomenon refers to things which are new, modern, advanced, high-tech or the latest.

[3] Improved efficiency means assisting humans, making work easier, usefulness, beneficial, faster etc.

Technology is further viewed as providing improved efficiency (17%) because it is efficient and makes life easier and comfortable as supported by this quote:

> *Technology means how computers work and other machines that make jobs easier (FJ'Ag'M35)*

Technology is also viewed as an application (15%) because it is applying theory to a practical use as illustrated in the following quote:

> *I think it would be the application of a theory to a practical project (FJ'Tech/Maths'M10)*

Technology is again viewed as problem-solving (8%) because mechanical and computerized machines often solve problems as illustrated by the quote given below:

> *To me it is solving problems through the use of mechanical devices like machines (FJ'Tech/Sc'M6)*

The next section will cover examples of things students see as technology.

- **Examples of things students perceive as technology**

Table 6.12 identifies examples of things students perceive as technology.

Table 6. 12: Examples of things students consider to be technology.

Examples of things students perceive as technology	Students M	Students F	Total N = 60	Percentage (%)
Artefacts *(electrical devices, machines, vehicle , tools, engines)*	33	22	55	92%
[4]Process *(technique, development, construction, engineering, T/D)*	2	3	5	8%
Total	**35**	**25**	**60**	**100%**

Examples of things students consider to be technology can be divided into two main categories: artefacts and process. Most examples of technology given by students were artefacts (92%) because they represented things like electrical devices, machines, vehicles, tools and engines as illustrated in the quote as given below:

> *Examples of technology are computers, type writers and other modern machines we use nowadays (FJ'Steno'F1)*

[4] Process in this study means application, techniques, development, construction, the application of theoretical knowledge to practical skill.

Only eight percent of students' examples of technology were listed under process as illustrated in the quote given below:

The techniques of cooking (FJ'FN'F15)

The next section will cover students' reasons for choosing these examples of technology

- **Reasons for choosing the previous examples as technology**

Table 6.13 shows the reasons for the choices of examples as listed in Table 6. 12.

Table 6. 13: Students' reasons for choosing examples of technology in Table 6. 12.

Reasons for choosing the previous examples as technology	Students M	Students F	Total N = 60	Percentage (%)
Improved Efficiency *(assisting human, usefulness, fast, better, easier)*	20	12	32	53%
Technical Process *(development, design, mechanical, construction, invention, techniques)*	8	6	14	23%
Recent Phenomenon *(new, advance, latest, western, overseas)*	5	4	9	15%
[5]Mana *(concept of being blessed & having power, ability to do work)*	2	3	5	8%
Total	**35**	**25**	**60**	**100%**

Reasons students gave for choosing things as technology can be divided into four categories. Improved efficiency (53%) was a reason for choosing the selection of examples as technology, because they make work easier for humans as illustrated in the quote given below:

They tend to make work much easier and they do peoples work instead of man (FJ'HE'F7)

Technical process (23%) was another reason for selecting examples as technology because in building, specific steps are required to complete the process as illustrated in the quote on building technology:

It is a technical process for example in building technology, which involves research, planning, designing and construction (FJ'Sc'M43)

Recent phenomenon (15%) was another reason for selecting examples as technology because things like machines are now modern, advanced and efficient as illustrated in the quote given below:

[5] Mana is an indigenous South Pacific Island term describing the source of power, strength, amazing ability, sacredness, blessing and goodness of that entity. It also refers to supernatural happenings, unexplained events, prosperity or curse.

Because they deal with machines and they are advanced and modern (FJ'Sc'M19)

Mana (8%) was yet another reason for selecting examples as technology because it has power and the ability to do things and creating awe as illustrated by a students' quote on a light bulb as given below:

An electrical light bulb produces light without smoke (FJ'IA'M59)
Like computers, they have been provided with a memory to remember things (FJ'Ag'M35)

The next section is about students' reasons for liking technological things.

- **Reasons for liking technological things**

Table 6.14 below, identifies the reasons for students liking technological things

Table 6. 14: Reasons for students being attracted to technological things

Reasons for liking technological things	Students M	Students F	Total N = 60	Percentage (%)
Improved Efficiency *(easy, fast, helpful, beneficial)*	19	16	35	58%
Recent Phenomenon *(new, advance, challenges etc)*	6	6	12	20%
Mana *(being blessed & having power, ability to do work)*	4	3	7	12%
Aesthetically Designed *(scaled & well proportioned, good finishing, elegant, tasteful, the general arrangement or lay out of a product)*	6	0	6	10%
Total	**35**	**25**	**60**	**100%**

This table provided reasons that students liked technological things. Improved efficiency (58%) was a reason given in liking technological things. Improved efficiency means that the electrical cooking method replaces firewood because it is a fast, easy and very efficient way of cooking as illustrated in the quote given below:

It's easy to use for example, the electric stove, you don't have to light the fire with matches and wood, you turn on the switch and cook (FJ'HE'F21)

Recent phenomenon (20%) was another reason for liking technological things because these things were described as new, modern and advanced as illustrated in the quote given below.

They are modern and new in every way. Look at the computer, they change every year (FJ'SC'F55)

Mana (12%) again was a reason for liking technological things because of its uniqueness, ability and challenge to the human race as illustrated in the quote given below:

> *They are challenging. You have to think in order to understand them (FJ'Tech/Sc'M5)*

Technological things were aesthetically designed (10%) and pleasing to the eye as illustrated by two quotes below:

> *I like their appearance and shape (FJ'Tech'M44)*

The next section will cover the kinds of technology students would like to learn in school.

- **Kinds of technology students would like to learn in school**

Table 6.15 identifies the kinds of technology students would like to learn in school.

Table 6. 15: Kinds of technology students like to learn in school

Kinds of technology students would like to learn in school	**Students M**	**F**	**Total N = 60**	**Percentage (%)**
Computer Studies	10	12	22	37%
Intermediate Technology *(training & practice in wood, machine, food, drawing, automotive, plumbing, etc)*	14	8	22	37%
Engineering Technology *(theory & practice in mechanical, electrical, electronics, chemical, aircraft, aviation)*	10	3	13	22%
No Interest & Don't Know	1	2	3	5%
Total	**35**	**25**	**60**	**100%**

Students (37%) said they would like to learn computing because it might be useful in the future as illustrated in the quotes given below:

> *I rather learn AutoCAD and technical drawing. I would also like to learn aspects of designing (FJ'Steno'F1).*
> *I would like to learn how to use the computer because we might use it in future (FJ'Phy'F30).*

Students (33%) said they would like to learn some intermediate technology because they have an interest in it as illustrated in the quote given below:

> *Something on wood technology and the usage of it which I can apply in every day work (FJ'TechM9).*
>
> *I am interested in learning about how to use the different tools in a wood technology workshop (FJ'Sc'F55)*

Students (22%) said they would like to learn some engineering technology because this could be a possible future career as illustrated in the quote given below:

> *Mechanical engineering because it deals with subjects and the course I am planning to take (FJ'Sc'M19).*
>
> *I would like to learn more about engineering because it deals with the real life structures like buildings, dams and bridges (FJ'Tech/Sc'F52).*

The next section will deal with the kinds of technology that younger children would be interested in doing at school.

- **Kinds of technology students would be 'interested' in doing at school**

Table 6.16 identifies the kinds of technology students would be interested in doing at school.

Table 6. 16: The kinds of technology students would be interested in doing at school.

Kinds of technology students would be interested in doing at school.	Students M	Students F	Total N = 60	Percentage (%)
Computer Studies	15	10	25	42%
Basic Intermediate Technology *(practice with simple concept, wood, projects, building, industrial arts, T/D, designing, mechanical, electrical)*	15	8	23	38%
Craft Education *(involving in play, creativity, drawing)*	3	4	7	12%
Recent Phenomenon *(new, video games)*	1	1	2	3%
Own Choice *(depends on individual's interest)*	1	2	3	5%
Total	**35**	**25**	**60**	**100%**

The kinds of technology students would be interested in doing at school varied. Forty-two percent of students said they would be interested in doing computing at school as supported by the quote given below:

> *Computers because it's got everything in it for example, videos games etc (FJ'HE'F7).*

Basic intermediate technology (38%) would be another area of interest to students as illustrated in the quote given below:

> *Home technology like making simple things out of papers, sheet metals, cardboard and pieces of wood etc (FJ'FN'F17).*

Arts and Craft (12%) is also selected as an area students would be interested in because it involves students participating in practical activities as illustrated in the quote given:

Craft education which involves practical activities (FJ'FN'F16).

Recent phenomenon (3%) was selected as an area of possible interest because it describes modern things, the latest new inventions and things that are being used in their daily life as illustrated in the quote given below:

Most will be interested in either mechanical, electrical or electronic devices. I say this because these are interesting and fascinating things. We see all these things on TV, at home and in school and they influence the way we do things and the way we live today (FJ'Tech/Sc'M5).

Five percent of students also felt that children should be given the opportunity to choose for themselves as illustrated with this quote:

Its really up to their own choice (FJ'Steno'F1)

The next section will cover students' perceptions of doing technology at school.

- **Perceptions of doing technology at school**

Table 6.17 illustrates students' definitions of the term doing technology at school.

Table 6. 17: Students' definition of doing technology at school.

Perceptions of doing technology at school	Students M	Students F	Total N = 60	Percentage (%)
Broadening of Knowledge *(exposed to knowledge, gaining knowledge, knowing, future, new ideas, educating self)*	17	8	25	42%
Practical Activity *(making things by hand, machines, designing, doing, working)*	10	8	18	30%
Learning Process *(new ideas, technologies, subjects, something, practical knowledge)*	3	7	10	17%
Improving Skills*(creating, interest, abilities, base knowledge)*	5	2	7	12%
Total	**35**	**25**	**60**	**100%**

Students described doing technology in four different ways. Forty-two percent of students said that doing technology is a way to broaden their knowledge because it expands their knowledge and understanding as illustrated in the three quotes given below:

It will help broaden my mind, my perspective and my way of thinking (FJ'Tech'M41).

It means a step further in educating myself (FJ'Tech'M9).

Making myself exposed to all this new technology (FJ'FN'F15).

Doing technology is also interpreted as a practical activity (30%) because it is making things and doing things. It is further seen as using your hands as illustrated by the two quotes given below:

> *I think it means practical activities performed by an individual or a group (FJ'Steno'F2)*
>
> *It is making things by hand, like drawing or designing a project (FJ'HE'F21).*

Students also view doing technology as a learning process (17%) by educating oneself with the computer or learning something new or learning something practical from school as illustrated by these two quotes below:

> *Learning new things like computing (FJ'HE'F7)*
>
> *Learning practical subjects in school (FJ'HE'M25)*

Doing technology was also defined as improving skills (12%) by taking part and being involved in any activity which improves manipulative skills as illustrated in the two quotes given below:

> *Doing technology to me means taking part in an activity to improve my skills in that particular area (FJ'Sc'M42).*
>
> *It will help me in developing my engineering skills (FJ'Tech'M44)*

The next section will cover students' perceptions of traditional technology

6.5 PERCEPTIONS OF TRADITIONAL TECHNOLOGY

This section discusses knowledge of traditional technology, examples of traditional technology, reasons for learning traditional technology and the usefulness of traditional technology today.

- **Knowledge of traditional technology**

In Table 6.18 students commented on knowledge of their traditional technology in their own culture.

Table 6. 18: Students' indication of having some knowledge of traditional technology.

Knowledge of traditional technology	Students M	Students F	Total N = 60	Percentage (%)
Yes	28	18	46	77%
No	5	3	8	13%
Not Sure	2	4	6	10%
Total	**35**	**25**	**60**	**100%**

Most students (77%) said they have knowledge of traditional technology as illustrated by these two quotes given below:

Yes we have pre-industrial traditions (FJ'HE'F25)

There is traditional technology in my culture (FJ'IA'M60)

Thirteen percent of students said they had no knowledge of traditional technology because they grew up in town as illustrated by the two quotes given below:

I don't know I grew up in Suva City. My home island is very far away (FJ'HE'F22)

Probably not. I don't know. I grew up in Suva (FJ'HE'F24)

I don't know because I grew up in town (FJ'Sc'M42)

I don't think so (FJ'Tech/Sc'M53)

Ten percent of students said they were not sure as illustrated by the quote below:

I am not really sure (FJ'Tech/Maths'M10)

I don't really know I got traditional technology in my culture. Sorry I can not answer that question (FJ'HE'F21)

From my knowledge I don't think I could remember anything (FJ'Tech/Sc'M50)

The next section cover students' examples of traditional technology

- **Examples of traditional technology**

In table 6.19 below students gave examples of traditional technology

Table 6.19: A list of examples of traditional technology.

Examples of traditional technology	Students M	Students F	Total N = 60	Percentage (%)
Cooking *(lovo)*	8	3	11	18%
Transport *(drua)*	4	4	8	13%
Buildings *(bure)*	5	3	8	13%
Fishing *(siwa)*	2	6	8	13%
Handicrafts	2	4	6	10%
Farming *(teitei)*	4	2	6	10%
Tools & Weapons *(valu)*	4	0	4	7%
Manners & Protocol (sevusevu)	1	1	2	3%
Dress & Costumes *(liku, malo)*	2	0	2	3%
Communication (lali)	2	0	2	3%
Folklore & Dances *(meke)*	0	1	1	2%
Do not know & Not Sure	1	1	2	3%
Total	**35**	**25**	**60**	**100%**

Examples of traditional technology given by students were numerous, for example cooking (18%) in a heated earthen oven is called a lovo, and it cooks the food over several hours as stated in a students' quote below:

> *Traditional cooking like 'lovo'. (FJ'Tech/Maths'M10)*

The traditional Fijian ocean-going canoe (drua) is an example of a traditional transport technology (13%) as shown in the quote given below:

> *Things of the olden days like the old methods of transportation, for example, the Fijian drua (FJ'HE'F7)*

The traditional house (13%) was an example of a traditional technology as illustrated by this student's quote:

> *A traditional Fijian house such as the bure (FJ'Sc'M47)*

Traditional fishing (13%) is another example of traditional technology identified by students as illustrated in the quote given below:

> *Catching fish with bamboo (FJ'HE'F22)*

Traditional handicrafts (10%) is another example of traditional technology and supported by the quote given below:

> *Traditional crafts like making spears and dance costumes (FJ'HE'F20)*

Traditional farming methods (10%) is another example of traditional technology identified by a student as illustrated by the quote given below:

Traditional farming methods or Teitei (FJ'Tech'M26)

Traditional tools and weapons (7%) were good examples of traditional technology as given by students supported by this quote:

The making of traditional war clubs and fighting gears (FJ'IA'M59)

Other students (11%) chose examples such as manners, protocol, dress and costumes, communication, folklore and dance, while two students said they were not sure.

The next section will cover student's reasons for learning traditional technology.

- **Reasons for learning traditional technology**

Table 6.20, shows students' reasons for learning traditional technology

Table 6. 20: Reasons given by students for learning traditional technology.

Reasons for learning traditional technology today	Students M	Students F	Total N = 60	Percentage (%)
Maintaining Identity & Survival of Fijian Culture *(tradition, heritage, cultural knowledge, benefits)*	34	23	57	95%
No longer applicable today	1	2	3	5%
Total	**35**	**25**	**60**	**100%**

The main reason for learning traditional technology was to maintain their identity as a Fijian and for the survival of Fijian Culture (95%) as illustrated by the quotes given below:

It is our identity (FJ'IA'M60)

It will help us in our daily life (FJ'Sec'F3)

Only five percent of students interviewed said that traditional technology is no longer applicable today.

The next section covers usefulness of traditional technology to day.

- **Usefulness of traditional technology today**

In table 6.21, students gave their views on the usefulness of traditional technology today.

Table 6. 21: Usefulness of traditional technology in Fijian Society today .

Usefulness of traditional technology today	Students		Total	Percentage
	M	F	N = 60	(%)
Useful	32	23	55	92%
Not Useful	3	2	5	8%
Total	**35**	**25**	**60**	**100%**

The majority of students (92%) said traditional technology is still very useful in Fijian Society today and this is endorsed by two quotes given below:

> *It has a place in society. Many people in the village still use traditional methods of doing things (FJ'Steno'F1)*
> *Yes, it is still useful in the traditional Fijian way of life (FJ'Sc'F55)*

Eight percent of students said traditional technology is not useful today because of western influence and this is supported by a student's quote given below:

> *I don't think it is useful because now everything is being modernized. Everything has been changed. People no longer follow their traditions (FJ'HE'F7)*

This section has shown student's perceptions of traditional technology. The next section is a summary of findings.

6.6 SUMMARY OF FINDINGS

The following is a summary of findings of the overall students' perceptions (no distinction between ethnic groups) of technical education, technology and traditional technology in Fiji.

This research found that high school subjects in Fiji are highly streamed and are academically oriented while technical subjects are offered on a gender basis. The study also found a trend regarding high levels of enrolment in academic subjects for example, in English (100%) and Maths (92%) while fewer students took technical subjects for example, industrial arts (15%) and home economics (7%).

Another finding of this study and a common trend was the high percentage (92%) of students enrolling in particular subjects because of perceived benefits, for example future career (92%) while 8% said the subjects were chosen because of interest. This strongly suggests that their future career, was the main motivating factor for subject choice. The study also found that students' career choices varied from technical related careers (88%) for example, engineering or architecture (53%), medicine (22%) to others (13%) such as the service industry. The study also found students (92%) enrolled in a particular subject because they believed it would help them in their future careers. The study further found that 92% of students said high school subjects were useful for future careers while 8% said they were not. In the area of decision making for future careers, this study found that 75% of students made their own decisions while 25% said decision-making was influenced by parents or relatives.

This study also revealed that students liked to learn other subject areas apart from their subject majors. They list the following as their preferences; computing (28%), engineering and technology (20%), sports and music (17%), culture (15%), science (13%) and others (8%). It is worth noting that computing topped the list of preferences, indicating the students' awareness of the value of computers to the working world.

The study also showed that students perceived technical subjects as a core subject (required knowledge) for other subjects. They also perceived them as being important and useful but need improvement (68%) while 32% said they lack emphasis or support from the school, and need revision because they are outdated. The term 'useful' could be influenced by the emphasis that traditional Fijian society puts on traditional activities. Students showed a sixty-seven percent level of interest in the existing technical education curriculum because they were useful for life while 33% of students said they were not. The majority of students (95%) said the technical curriculum is relevant while 5% disagreed.

The main focus of this study was to identify students' perceptions of technology. Most students perceive technology as artefacts (33%) because they are machines while 8% said technology was problem-solving. Examples given by students regarding technology were as artefacts (92%) and process (8%). Students' gave many reasons for examples of technology but said they chose examples based on improved efficiency (53%) and mana (8%). Improved efficiency and mana were based on performance efficiency and the amazing ability of what technology can do. The study also revealed that students had a liking for technological things and the reasons given were again the improved efficiency (58%) and aesthetic value (10%). The study also showed that students would like to learn other kinds of technology at school and preferred computing (37%) to engineering technology (22%). This was also true with students who would be interested in computing (42%) rather than recent phenomenon type technology (3%).

The study also revealed that doing technology at school was perceived as broadening their knowledge (42%), practical activity (30%), learning process (17%) and improving skills (12%).

The study also showed that 77% of students have knowledge about traditional technology, 13% had no knowledge while 10% were unsure. Students said the reason for not having knowledge of traditional technology was because they grew up in the city. Examples of traditional technology given by students who had a vast knowledge of their traditional technology ranged from cooking (18%) to folklore and dance (2%). The study also revealed that the reasons for learning traditional technology was mainly to maintain a Fijian identity and the survival of the Fijian culture (95%). It was also made clear by the students (92%) that traditional technology is still very useful in Fijian Society today.

This chapter has provided the findings concerning students' perceptions of technical education, technology and traditional technology in Fiji. The next chapter (chapter 7) will focus on the educators' perceptions of technical education, technology, technology education and traditional technology in Fiji.

CHAPTER 7

EDUCATORS' PERCEPTIONS OF TECHNICAL EDUCATION, TECHNOLOGY, TECHNOLOGY EDUCATION AND TRADITIONAL TECHNOLOGY IN FIJI

The teacher has an important role to play in the community in which he lives far beyond the confines of his classroom and school compound. Dr Isireli Lasaqa, (1984).

7.1 INTRODUCTION

The previous chapter discussed students' perceptions of technical education, technology and traditional technology in Fiji. This chapter will focus on the educators' perceptions of technical education, technology, technology education and traditional technology in Fiji. There were 40 educators interviewed of which 25 were males and 15 were females. Educators interviewed included high school teachers (22), tertiary teachers (10), principals (4) and curriculum developers (4) who were based at the Ministry of Education. The educators interviewed for this research were from different subject areas. Educators are important resources for curriculum innovation and educational change (Hood, 1998) therefore their perceptions are important for this research. Educators' perceptions were important to this research because of their role in influencing the curriculum, which came from their interactions with scholars, parents, other citizens and students. According to Hass (2000), the educators' role was to provide structure for planning with others, to inform, to offer recommendations, to bring together contributions from many sources and to work out a recommended plan of action.

This chapter is divided into six sections. The remainder of this chapter reports on:

7.2 Perceptions on Existing Technical Education.
7.3 Perceptions of Technology.
7.4 Perceptions of Technology Education.
7.5 Perceptions of Traditional Technology.
7.6 Summary of the Findings.

7.2 PERCEPTIONS OF EXISTING TECHNICAL EDUCATION

This section covers perceptions of existing technical education, the perceived purpose of technical education, a comparison of existing technical curriculum with other curriculum, the relevance of the existing technical curriculum, the popularity of existing technical education, perceptions on how background knowledge in other subjects help in the teaching of technical subjects, weakness of technical education and suggestions to improve the quality of the technical curriculum.

- **Perceptions of the existing technical education curriculum**

Table 7.1 educators revealed their perceptions of the existing technical curriculum.

Table 7. 1: Perceptions of the existing technical education curriculum in Fiji high school.

Perception of 'existing' technical education curriculum	Educators M	Educators F	Total N = 40	Percentage (%)
Needs Revision *(out of date curriculum, needs change, expanding, linking, identity & improvement)*	22	13	35	87.5%
Adequate *(right track, a local curriculum, meet local demand)*	3	2	5	12.5%
Total	**25**	**15**	**40**	**100%**

Eighty seven point five percent of educators stated that the existing technical education curriculum needs revision, change and improvements, because the existing technical curriculum is out-dated as it was written in the 1970's. There was also a concern regarding the lack of linkage between subject contents from the lower levels to the upper levels at high school as illustrated in the four quotes given below:

> *What I feel is that this curriculum needs a lot of revision. For the past 10 years I don't think there has been any revision or any improvement in the curriculum especially now with more advanced technology (FJ'IA'M21).*

> *I think it needs improvement because of the many areas and also there seems to be no link from Form 6 Industrial Arts to Introduction to Technology in Form 7. I think there should be a strong link between these areas. At the moment Industrial Arts and Introduction to Technology are working independently. I am also concerned that certain components of Industrial Arts only go up to Form 5 and no further. There is no continuation and there is no gradual development (FJ'IA'M1).*

> *I think there should be a change, an overall change of the technical curriculum. In my teaching career in Industrial Arts I found that there is no link with what they do at Form 6 level to the tertiary level (FJ'IA'M8)*

I think the curriculum which we have right now needs to be changed because we are still using the same curriculum from the 70's and perhaps it is only suitable to those people in those times (FJ'HE'F29).

Educators said that in many cases schools operate independently from each other and subjects that were being taught at lower levels were not linking with the upper levels. Educators felt that there should be more interaction to create continuity and links between subject areas and other institutions. In essence, teachers and schools should work together. However, other educators (12.5%) said that the existing technical curriculum is adequate for the present time because it is a local curriculum. They further stated that there is always room for improvement as supported by the two quotes given below:

I think it is adequate at the present moment although it can be improved and further developed given the constant change in technological advancement (FJ'Ag'M27).

The existing technical curriculum is a localized curriculum. Previously Fiji secondary schools were using the New Zealand school curriculum but since 1989 the curriculum, particularly for the Fiji Leaving Certificate, has been localized and since then we have been using our curriculum at the FLC level. When this curriculum was prepared for local use, consideration was given for the local needs and bearing that in mind this curriculum was developed (FJ'IA'M40).

Educators were also concerned about being left behind technologically, therefore they suggested that the curriculum developers needed to address the issue of technological advancement domestically and internationally. The next section will cover the perceived purpose of technical education in Fiji.

- **Perceived purpose of technical education**

Table 7.2 revealed educators' perceptions on the purpose of technical education.

Table 7. 2: Educators' perceptions of the purpose of technical education.

Perceived purpose of technical education	Educators		Total	Percentage
	M	F	N = 40	(%)
Basic Education *(educate, delivery, introducing, preparation for life)*	13	6	19	47.5%
Practical Education *(hands-on, practical, doing, related to work)*	10	6	16	40%
Sustainable Knowledge *(accumulation of classroom knowledge)*	1	2	3	7.5%
Classroom Subjects *(HE, IA, woodwork, metalwork)*	1	1	2	5%
Total	**25**	**15**	**40**	**100%**

Educators' perceptions of the purpose of technical education were divided into five categories. Most educators (47.5%) said that the purpose of technical education was to provide a basic education as illustrated in the two quotes given below:

> *Technical education from my own view is the teaching of technical subjects that we have in the high schools (FJ'IA'M5)*
>
> *It is learning about skills, doing things with hands. A hands on approach type of thing. Using your manual skills, and psychomotor skills to be able to do things. The education part of it is teaching how to perform these particular skills. Teaching through practice, teaching through example, teaching through drills, teaching through experimentation. It is the development of manipulative skills. The nurturing of manipulative skills in people (FJ'Sc'M26).*

Educators also said that the purpose of technical education is learning skills by doing and by example. Educators viewed this as developing and preparing students to face the real working world. Forty percent of educators said the purpose of technical education was to provide practical education because it was hands on education as illustrated in the quotes given below:

> *I would say the purpose of technical education is to enable students to do things and to make things with their hands. In Fiji, the original definition was exemplified by the existence of workshops for woodwork and metalwork where pupils were involved in carpentry and joinery. Having gone through these courses, pupils were able to build things with their hands using the skills they learnt from these trades (FJ'P/M'M34).*
>
> *Technical education to me means the use of hands, to be practical and applying what was learnt in theory for example. The application in technical drawing, construction of a project and fabrication of things (FJ'Geo'M35).*

Educators also stated that the purpose of technical education is the application of a theory to practical activities as shown by the these two above quotes. The critical issue is being able to apply the theoretical knowledge learnt, to workshop practice. Other educators (7.5%) said the purpose of technical education was to give students sustainable knowledge to help them in life as illustrated in the quote given below:

> *Technical education provides enlightenment to pupils. When students acquire all this knowledge it gives them confidence to take control of their future because they understood it well and know what to do with it. It gives them power. Technical education is an opportunity and optional career path for students. In woodwork and related areas some of them can become carpenters or engineers , so it is sort of opening up their views and possible opportunities for them (FJ'M/P/CS'M36).*

A small number of educators (5%) said the purpose of technical education was to give students the theoretical knowledge of classroom subjects. Educators also valued the importance of classroom theory knowledge in technical education. A typical quote illustrating classroom subjects is given below:

> *Technical education to me would be subjects like Home Economic, Industrial Arts, Woodwork and Metalwork. These are some examples of classroom subjects which teach knowledge for real life (FJ'FT'F24).*

The fact that educators selected the above practical oriented subjects, indicates the importance, position and role of these subjects in Fijian schools. The next section compares the existing technical curriculum with other curriculum.

- **Comparison of the existing technical curriculum with other curriculum**

Table 7.3 compared the technical curriculum with other school curriculum.

Table 7. 3: Comparison of the technical education curriculum with other curriculum.

Comparison of 'existing' technical education curriculum with other curriculum	**Educators M**	**F**	**Total N = 40**	**Percentage (%)**
Needs Revision & Improvement *(out-of-date curriculum, second class curriculum, lack emphasis & support, gender)*	15	12	27	67.5%
Comparable & Supported *(relevant, same, equal, progressed, moving forward together etc)*	7	3	10	25%
Difficult to compare *(different subjects with different concept & objectives, not familiar with subject areas)*	3	0	3	7.5%
Total	**25**	**15**	**40**	**100%**

When comparing the technical curriculum with other curriculum, educators (67%) said that the technical education curriculum needs revision and improvement because it lacks emphasis and lacks support. In addition educators were also aware of the influx of modern technology into Fiji and the impact it is having on the country. Educators' were concerned that with the existing technical education curriculum Fiji may not be able to keep its citizens up to date with the latest technology as shown in the quote below:

> *I would say the technical curriculum needs revision and up-grading because firstly, there has been a tremendous influx of modern technology into Fiji in recent years and these technologies have made a big impact on the economy of the country and secondly, education in technology has not kept pace with all these rapid changes in society. It always surprises me that the education department is always one or two years behind the private enterprises in its introduction of modern technology (FJ'P/M'M34).*

Other educators (25%) commented that the technical curriculum was comparable to other curriculum and was well supported because they had been personally involved in the development of the curriculum. The reason given was that what existed in the technical education curriculum was based on a needs analysis of the community as illustrated by the two quotes given below:

> *We have been involved in curriculum development together with the other officers from other disciplines particularly within the technical section, so most of the curriculum work that has been done was done on the basis that the needs in different areas are looked at, therefore the technical curriculum is very much comparable to other curriculum (FJ'IA'M40).*

> *It is well supported by the government. This is shown by a visit from the Curriculum Development Unit people which did not happen in the past. We normally had visits from Pitmans perhaps because they are the ones preparing our exams but this year the CDU from the Ministry of Education recognized our department in a way by the visit (FJ'VT'M14).*

Other educators (7.5%) found it difficult to compare technical subjects with the more traditional school curriculum such as maths, the sciences and the social sciences because according to educators, they are different in nature. Educators' suggested that the new subjects such as technology education (this includes home economics) should be allowed to develop and establish themselves as a classroom subject as illustrated in the quote given below:

> *I find it hard to compare the Home Economics curriculum with other school subject areas because we certainly deal with different subjects. I suppose the difference with the other subjects is the fact that a lot of the other subjects are fairly well established. They have been traditional subjects within the school curriculum. They've been in existence for a much longer period than Home Economics. The Home Economics curriculum is relatively new and therefore is still trying to establish itself as a discipline within the school system. I think this is one problem the Home Economic Curriculum Developers are struggling with in that they are trying to compete with well established curriculum (FJ'HE'F1).*

One important factor which could help in the development of a new curriculum is to view each curriculum as being distinct and different from each other, therefore they should not be compared with each other. The next section will cover the relevance of the existing technical education curriculum.

- **Relevance of the existing technical education curriculum**

In table 7.4 below, educators gave their views on the relevance of the existing technical education curriculum.

Table 7. 4: The relevance of the technical curriculum of Fiji.

Relevance of 'existing' technical education curriculum	Educators M	F	Total N = 40	Percentage (%)
Yes, it is relevant	12	8	20	50%
No, it is not relevant	8	4	12	30%
To an extent *(some part, certain level)*	5	3	8	20%
Total	**25**	**15**	**40**	**100%**

Fifty percent of educators said technical education was relevant, 30% said it was not and 20% said it was relevant to an extent. The answer to the phrase 'to an extent' implies that certain sections of the technical curriculum were adequate but not all of it. Table 7.4 also showed that educators were split in their perceptions of the relevance of the existing technical education curriculum although the view 'to an extent' could be interpreted as leaning towards relevance. Two typical quotes supporting 'yes', as a relevant answer is given below:

> *It is relevant to the country. I know what they were trying to do was to train those who could not obtain a white collar job in practical skills such as catering, sewing or any other skilled technical areas (FJ'HE'F10)*
>
> *I think it is very relevant because not every one will end up doing university degree. There may be others who are not academically good but if they are directed to these areas they should help them get a job at the end (FJ'P/M/'M34).*

Educators were also aware of the fact that not all students are academically inclined therefore, what was being taught to students was relevant and appropriate. Equipping students with skills such as sewing or catering would assist students in their daily lives. Thirty percent of educators thought that technical education was not relevant because it can not be used in the rural areas. Two typical 'no' type answers are given below:

> *At present I think it is not relevant. I think the technical education curriculum is behind in many areas (FJ'IA'M13)*
>
> *To me the curriculum is not relevant. I say this because what is being provided here in town is relevant only to the city areas but not in the rural areas. Is the government catering for the need of the rural people? (FJ'IA'M2)*

Twenty percent of educators said only certain portions of the technical education curriculum were relevant, because some of the content and concepts were foreign and were adopted from the colonial era, so students could not relate to it at all. Educators also pointed out that teachers lack the initiative to use local examples to clarify ideas and concepts for better understanding as illustrated in the quote given below:

> *Yes, I think it is relevant but only for certain areas and at a certain level. My concern is that some of the content and concepts used are foreign and students find it hard to relate it to every day life. Teachers should try to use local examples for a better understanding (FJ'IA'M3).*

Educators commented on the relevancy of the existing technical education curriculum but also indicated areas which could be improved. The next section will deal with the level of students' interest in the technical education curriculum.

- **Level of interest in the existing technical education curriculum**

In table 7.5 educators gave their perceptions on students' level of interest in the existing technical education curriculum.

Table 7. 5: Students' level of interest of technical education curriculum by educators.

Level of interest in the existing technical education curriculum	Educators		Total	Percentage
	M	F	N = 40	(%)
Yes, Interested In	9	7	16	40%
Not Interested In	11	4	15	37.5%
Difficult to answer	4	3	7	17.5%
To an extent	1	1	2	5%
Total	**25**	**15**	**40**	**100%**

The issue concerning students' levels of interest in the technical education curriculum can be gauged by viewing the above table. Forty percent of educators said that technical education is popular with students because it provides students with knowledge and skills. The level of interest was also seen in terms of instant results, and students having pride and appreciation in class practical activities as illustrated with the two typical quotes concerning industrial arts and home economics given below:

> *It is popular with students in that it provides students with skills and knowledge which they can use not only at the urban but at the rural level. Many former students equipped with these skills are now self employed and doing well in their business (FJ'Ag'M27).*

> *Technical education is still very popular with students because like in industrial arts they actually see what they have made through their practical work. The same can be said of students taking home economics. They eat the food they learn to make in class so I think it is still very popular. There is an atmosphere of appreciation (FJ' Sc'F33).*

Educators (37.5%) said that technical education is not popular because the government is not investing enough into the programme and students could see. According to educators, students want a well paid job at the end of their study career and did not want to be part of a programme not approved by the government. The technical education programme needs to be made more attractive through planning and better coordination as illustrated in the two quotes below:

> *I think it is not popular because even the government is not investing into the technical education curriculum in the country. Students can also see this trend therefore they are not keen on studying something which the government won't invest in. They want a good job because it will mean a better future for them and academic subjects provide for that aspiration (FJ'VT'M14).*

> *I think the trend has been set by the colonial system of education and unless a major education review is carried out the trend will continue. We need to break out of the existing system to give all subjects a new opportunity to prove their value to the community. Technical education can be popular if it is better planned and better coordinated (FJ'IA'M16).*

Some educators (17.5%) found the issue regarding levels of interest difficult to answer due to many factors. Educators indicated that students were being 'turned off' by technical education subjects. The subject being offered were not attractive, not useful for their future, not appropriate or students could not cope in terms of their abilities and capabilities as illustrated by quote given below:

> *Its a hard question but then again my opinion is based on my observation in particular talking to the teachers. Their opinion was that students are being "turned off" so I suppose we can assume from those comments that its not very popular with the students. From that we can assume that its popularity actually follows on from what they are doing because it is well beyond their abilities and capabilities and the students see it as irrelevant (FJ'HE'F1).*

A few educators (5%) used the phrase 'to an extent' to mean that some parts of the curriculum were useful while others areas were not as useful. The quote also implied that there was a lack of coordination and the programme was implemented haphazardly as illustrated by the quote given below:

> *I think some parts of the technical curriculum are popular but some aren't. The popular bits need to be continued and the other not so popular sections need to be improved. All areas should be brought together to make a balanced curriculum relevant to Fiji (FJ'HE'F29).*

According to educators, students' levels of interest in the existing technical education curriculum depend on many factors which if improved could attract many more students. The next section will cover how background knowledge in other subjects, helps in the teaching of technical subjects.

- **Perceptions of how further knowledge in other subjects will help in the teaching of technical subjects**

Table 7.6 below, comments on how further knowledge in other subjects can help educators in the teaching of technical subjects.

Table 7. 6: Educators' list of other subjects they would like to gain more knowledge in, to enable them to teach technical subjects.

Perceptions of how further knowledge in other subjects will help in the teaching of technical subjects	Educators M	F	Total N = 40	Percentage (%)
Related Areas *(industrial arts, home economics, navigation, electronics, automotive, agriculture, catering, multi-craft, joinery skills, engineering skills, practical skills, improvise technology)*	12	4	16	40%
Computing *(software, CADD LT, pascal, spreadsheet)*	9	5	14	35%
Recent Phenomenon *(new machines, overseas technologies)*	2	3	5	12.5%
Other Classroom School Subjects *(Science Technology, Physic, biochemistry, math & language)*	2	3	5	12.5%
Total	**25**	**15**	**40**	**100%**

There was a wide range of skills and knowledge educators would like to learn to better equip themselves to teach technical subjects. These are indicated in Table 7.6 namely: related areas, computing, recent phenomenon and other classroom school subjects. Thirty five percent of educators showed an interest in computing which means that they were aware of the importance of computing in the working world. Forty percent of educators said that a related technical area would be of interest as illustrated by the two quotes given below:

> *I want to learn more about Industrial Arts and the related technical areas of my teaching profession such as computer drawing. What I know now is what I am teaching, for example, woodwork and technical drawing (FJ'IA'M2).*

> *There is a very wide area that we need to equip ourselves for in order to become good technical teachers and there are courses which we could attend. What we now teach is based on our own skills and help we get from textbooks and help from our colleagues. We need to concentrate on specialized skills and knowledge like computing skills for now and the future (FJ'VT'M14).*

Educators also hinted that they would like to have the opportunity to attend further courses which could help them teach technical subjects, as most of what they were now teaching was learnt from textbooks. Thirty-five percent of educators said computing was an essential area in todays' working world because it enhances teaching and work productivity as illustrated in the quotes given below:

> *I had some training on CAD and while I am quite proficient with the PDS I am not familiar with pattern-grading. I feel I need to learn a little bit more in that area. Also if we could have a CAD here it would make teaching easier for me (FJ'FT'F25).*

> *Computing would be one area I am interested in because today everything is computerized and one would not want to be left behind. I am also interested in applied physics and electronics (FJ'P/M'M34).*

Technical educators stated that computing (especially CAD) is useful whether it be in pattern-grading, drafting or in other technical areas because 'today everything is computerized'. Educators (12.5%) also said recent phenomenon like new machines and new technologies would better prepare them to teach technical subjects. Educators' were aware of the influx of new technologies and new knowledge into Fiji and to be better informed would be a great help in their teaching profession. A quote supporting this notion is given below:

> *Maybe if we can get more training on the latest machines and go to other countries to see the new technologies they use, and whether we could adopt the ideas and implement them in our country. These new skills and knowledge will really give us confidence to teach (FJ'Ag'M18)*

Educators (7.5%) said they would like to learn about the science of the body in regard to food technology. Educators in Fiji were aware of the importance of diet and good eating habits in the students' learning process as this is critical. Educators further commented that they would not mind learning about the medical aspects of body physiology as illustrated in the quote given below:

> *I suppose in hindsight if I were to turn the clock back I would certainly would like to improve my background and certainly do a little bit more on physics and biochemistry. Certainly I would like to go into the medical aspects of body physiology and applied designing for different areas (FJ'FT'F24).*

Educators (5%) mentioned that other classroom subjects such as physics, maths, biochemistry and language would broaden their knowledge enhancing their teaching of technical education as illustrated in the quotes given below:

Learning maths and some of the science subjects. Its not because they are directly linked but the way we try to understand logic and how we reason things out in a particular manner will be useful if we do the same to computing because computing is mostly concerned with logic so it will enhance the childrens' way of reasoning and finding out things (FJ'CS'M31).

Educators admited that learning other subject areas would help them in the teaching of technical subjects as it would broaden their understanding of technical subjects as other subjects are also related to technical areas. The next section will discuss the weaknesses of the technical education curriculum.

- **Weaknesses of the existing technical education curriculum**

In table 7.7 below, educators identified the weaknesses of the existing technical education curriculum.

Table 7. 7: Weaknesses of the technical education curriculum.

Weaknesses of the exiting technical education curriculum	Educators M	F	Total N = 40	Percentage (%)
Lack Resources *(funding, equipment, expertise, text books, facilities)*	10	7	17	42.5%
Lack of Linking & Continuation *(high school to tertiary institutions)*	4	2	6	15%
Obsolete Curriculum *(content out-of-date, old prescription)*	3	2	5	12.5%
Lack of Support & Coordination *(training, basic knowledge)*	2	2	4	10%
Does Not Cater for Needs	1	1	2	5%
Attitude & Implementation Problems	1	1	2	5%
Foreign Curriculum	2	0	2	5%
Lacks Hands-on Experience	2	0	2	5%
Total	**25**	**15**	**40**	**100%**

Educators identified eight main weaknesses in the existing technical curriculum. These were identified through educators' past experiences in teaching technical subjects. Educators (42.5%) said the first weakness of the technical curriculum was the lack of resources as illustrated in the two quotes given below:

Many schools lack the resources needed to run a proper technical education curriculum. It has been said that running a technical education programme is expensive, but so are the academic subjects. I think the weakness is prioritizing what is important for the students and for the country (FJ'HE'F30).

One of the major drawbacks of technical education is funding. Many schools lack good facilities to run technical subjects. Other curriculum subjects seem to have funding made available to them whereas there is none for the technical education curriculum. In most cases individual teachers fundraise to keep the programmes running in the school. This should not be the case as teachers are there to teach and not fundraise (FJ'Sc'F33).

According to educators there were many factors which contributed to the lack of progress in technical education in high schools in Fiji, but they stated that the main drawback could be attributed to the lack of funding. It was also indicated in the previous quote that it is expensive to run a technical education programe but that can also be said of other more traditional subjects such as the sciences, the arts and the social sciences. As said in the previous quote 'prioritizing what is important to the country' is important. Educators (15%) also said there was a lack of linkage between high schools and tertiary institutions and this has caused disruption in the continuity of learning as illustrated in the quote given below:

> *What I see in technical subjects for example, Industrial Arts, is that there is no link between the high schools with technical institutions like Fiji Institute of Technology (FIT) and the University of the South Pacific (USP). What students learn from high school is quite different to that taught at tertiary institutions (FJ'IA'M22)*

According to educators, the schools and institutions offering technical subjects in Fiji are not working together, to better coordinate the technical education programme to avoid repetition and education gaps. This has resulted in difficulty for students coping when they enter tertiary institutions because what they learnt in high school has no bearing on what was being offered at the tertiary level. Another weakness highlighted by the educators' (12.5%) was the obsolete curriculum which was no longer relevant today as supported by the quote given below:

> *Looking at the prescription in the curriculum because this curriculum was developed in the late 80's, I think some of the material is out of date. It needs to be up-dated and we are in the process of revising the curriculum. The changes will be implemented next year (FJ'HE'F38).*

The existence of an out dated technical education curriculum in the school system was a concern to all educators as indicated in the quote above. This is because the existing technical education curriculum was developed in the 1980's, so it is not relevant in the 21st century. Educators (10%) also identified the lack of support as a weakness affecting the progress of technical education as illustrated in the quote below.

> *A weakness in the technical curriculum in our school system is that it is not well supported by the government and because of that, school administrators place less priority on it and more on academic subjects (FJ'HE'F29)*

This weakness is critical because it has to do with the attitudes of the administrators who are the decision-makers. The government and administrators are the money lending agencies therefore their support is critical. Unless this situation is rectified, technical education can not be expected to advance.

Other educators (20%) said the weaknesses of the existing technical curriculum include: attitude and implementation problems, the current curriculum does not cater for the students' needs, its a foreign curriculum and lacks hands-on experience. The next section discusses suggestions for improving the quality of the technical education curriculum.

- **Suggestions to improve the quality of the technical education curriculum**

Table 7.8 below, indicates the suggestions that educators made to improve the quality of technical education.

Table 7. 8: Suggestions for improving the quality of the technical education curriculum.

Suggestions for improvement of technical education curriculum	Educators M	Educators F	Total N = 40	Percentage (%)
Revise Curriculum *(up-grade, improve quality & quality, begin offering at primary level)*	10	3	13	32.5%
General Suggestions *(more funding, improve facilities, up-grade tools & machinery, up-grade curriculum content, train quality teachers, up-date with technology, adjust to change etc, less assessment process, establish more vocational centres)*	5	3	8	20%
Train Quality Teachers *(up-grade existing teachers)*	2	2	4	10%
Introduce Support Areas *(technical management, communication tools, material science, exams skilled-based)*	2	2	4	10%
Establish Continuous Linkage *(from primary to secondary and to tertiary)*	2	0	2	5%
Recruit Quality Students *(encourage students)*	1	1	2	5%
Establish Pool of Expert Resource *(train & up-grade teachers, specialists etc)*	1	0	1	2.5%
Better Coordination Mechanism *(national implementation)*	0	1	1	2.5%
A continuous in-house in-service training program *(seminars, workshops etc)*	1	0	1	2.5%
Produce Local Materials	0	1	1	2.5%
Establish Revolving Fund	0	1	1	2.5%
Establish Mobile Technology Unit	1	0	1	2.5%
Scrap Subject Division *(example: academic v technical)*	0	1	1	2.5%
Total	**25**	**15**	**40**	**100%**

Suggestions to improve the quality of the technical education curriculum are highlighted here. The suggestions came from concerns which have been raised by educators, concerning the quality and standard of the existing technical education curriculum in high schools. Educators (32.5%) suggested that a revision of the curriculum has to happen if there is to be improvement. According to educators revising the existing technical education curriculum is the only way to improve the quality and standard of the existing technical education curriculum as illustrated in the quote given below:

> *There is a need to revise the technical curriculum because that is the only way that standards of technical education can be raised and be compared with the other curriculum. The quality of the technical education curriculum is very much dependent on a revision of the existing curriculum (FJ'HE'F38).*

Educators (20%) also suggested many points to improve the quality of the technical education curriculum including: quality teachers, quality curriculum, quality facilities and quality students. These were classified as multiple suggestions. However, according to educators the level of quality can only be achieved through a review of the existing technical curriculum as illustrated by the quote given below:

> *The quality of technical education can be improved I think only through quality teachers, quality curriculum, quality facilities and quality students. I see no other way to improve but through these methods. To gain that level of quality there is also a need to review what already exists (FJ'CS'F39).*

Educators (10%) suggested that a professional organisation should be established. This organisation for technical teachers can be used in promoting technological knowledge and skills by way of arranging overseas visits or arranging programmes to expose them to the latest technology as illustrated by the quote given:

> *I think there is no professional organisation for technical teachers. I would like the teachers to be sent overseas to be better informed on technology. I'd like to see a lot of the teachers travelling abroad and under-go in-service training courses to up-grade them with the latest in their respective areas. Getting them exposed can be healthy (FJ'HE'F1).*

Educators (10%) also suggested that support areas in technology should be established to improve the quality of technical education. Educators highlighted technical management as an area which is lacking in the current structure. The quote below implies that technical management skills should also be included as illustrated below:

> *We want to include technical management because in the school system we have a program called income generating project and to be able to work out the cost and expenses needs good management (FJ'Ag'F17).*

Educators (5%) believed there is a lack of linkage and continuity of technical knowledge between primary, high schools, tertiary institutions and the Ministry of Education as they seemed to be operating independently. It was suggested that there be a continuous link as illustrated by the quote given below:

> *There seems to be little or no link between the high school curriculum with what is being taught at the USP department of technology, therefore I would like to see more interaction between these institutions. I would like to see the link beginning at the primary school level, right through the secondary level until tertiary institutions like USP. There is also very little interaction between USP and the Ministry of Education in terms of technical education. If there is a direct link between these institutions I think technical education can be better implemented throughout the country and the region because USP is a regional institution (FJ'Ag'M27).*

According to educators (5%) technical education needs good quality students if it is to improve which is not the case now. Educators' highlighted a trend where weak students were encouraged to take technical education subjects while the academically able students continued on in academic streams. Educators stated that this trend will have to change as illustrated in the quote given below:

> *I disagree with the trend which is currently practiced in the high school which shows a weak point in the technical curriculum. Students who are not performing well academically are often sent to us. I think this has to stop because we need good students to be technologists in the future. How can we produce good technologist if we get second grade students? This is a reflection of the type of attitude currently existing in the high schools (FJ'HE'F30).*

Other educators (17.5%) gave the following suggestions to improve the quality of the existing technical education curriculum: establishment of a pool of expert resources, better coordination mechanism, a continuous in-house in-service training programme, production of local materials, establish mobile technology unit and scrap subject division. The next section will discuss the educators' perceptions of technology .

7.3 PERCEPTIONS OF TECHNOLOGY

This section will cover educators' perceptions of technology and the kind of technology children would be interested in doing at school.

- **Educators' perceptions of technology**

In Table 7.9 educators gave their views on technology.

Table 7. 9: Educators' perceptions of technology.

Educators' Perceptions of Technology	Educators M	F	Total N = 40	Percentage (%)
Recent Phenomenon *(new, latest, advance, overseas, western)*	7	4	11	27.5%
Process *(application, invention)*	6	3	9	22.5%
Application *(study, learning, technical subjects, practical)*	6	2	8	20%
Artefacts *(machines, electrical devices, tools)*	1	5	6	15%
Hardware & Systems *(combination of technologies & activities)*	4	0	4	10%
Improved Efficiency *(assisting human, easier, faster, advance, better)*	1	1	2	5%
Total	**25**	**15**	**40**	**100%**

Educators' perceptions of technology is divided into six category as shown in Table 7.9. They include recent phenomenon (27.5%), process (22.5%), application (20%), artefacts (15%), hardware (10%) and improved efficiency (5%). These categories indicate that educators perceptions of technology vary greatly which may be due to subject majors, cultural and up-bringing differences. The Educators' (27.5%) perceived technology as recent phenomenon because they were new, recent, the latest and modern as illustrated in the quote given below:

> *My view of technology is the modernisation of technical equipment. For example, before it was the Drawing Board and the T-Square Rule, but now drawing is done with AutoCAD computers. Everything has been changed and modernised (FJ'M/P/CS'M36).*

The above quote is an educators' perception of the change in the technical drawing equipment as an example of modernisation. What was previously done manually, has now become computerised. Educators' (22.5%) also viewed technology as a process which involves some kind of application. The quote given below supports this notion:

> *Technology to me would be the process taken in making a project. The process normally begins with several designs. The best design is then chosen and construction begins. The process ends when the project is completed (FJ'Geo'M35)*

Educators' view 'process' as technology because in a technological activity such as completing a project, several designs and applications are required, which is a process. Educators' (20%) also view technology as an application, because classroom theory needs to be put into practice out in the field. In the case of animal husbandry the animal reproductivity process can either be retarded or accelerated by modern technology as illustrated in the quote below:

Technology is a little bit more than technical education. I think it involves the introduction of technical skills and knowledge into the system through theories, machines and things that help quicken things. It also changes the ways in which we do things to a more productive way. An example of technology in animal breeding is getting animals pregnant without the bull through artificial insemination. We can get them to go on heat by changing the cow's natural body cycle rather than letting it happen naturally. Through speeding up the animal's heating process this is what I mean by technology . Improvement of an animal's heating process by using either machines or artificial insemination techniques is technology. With the latest knowledge we can quicken, delay or even improve the animals reproduction process (FJ'Ag'M37).

The above quote also illustrates the use of technology as it can help in decision-making and in the direction of what needs to be achieved. Educators (15%) also view technology as artefacts because they are machines, tools and portable generators which help in making work easier, faster and better for humans. These, artefact according to educators, can be found where practical activities is a way of life, such as on the farm, at school, in workshops as illustrated in the quotes given below:

The mention of technology reminds me of machines, computers and all other machines (FJ'Sc'F33).

Technology to me would mean the tools we use in technical education for example, computers, sewing machines, different types of machines which are used in workshops and farming tools introduced to students at schools (FJ'CS'F39).

Educators (10%) also viewed technology as a kind of hardware and system because of a combination of all types of technologies which are now part of the daily activities in a modern lifestyle. According to educators, hardware and systems assist humans in building, making and moving things as illustrated by the quote given below.

Technology to me sounds like hardware and systems which are now part of our daily every day to day lifestyle. We are here talking about high tech machinery and equipment (FJ'Sc'M32).

Technology to me means the total collective assembly of machinery hardware and systems, which assists humans to build things. For example, electronics gadgetry, cranes, mechanical machinery etc (FJ'P/M'M34).

The quotes above from educators on technology indicated that their views vary greatly. The next section discusses the kinds of technology children would be interested in doing at school.

- **Kinds of technology students would be 'interested' in doing at school**

In table 7.10 below, educators identified the kinds of technology students would be interested in doing at school.

Table 7. 10: Kinds of technology students would be 'interested' in school

Kinds of technology students would be interested in doing at school	**Educators M**	**Educators F**	**Total N = 40**	**Percentage (%)**
Computer Technology	4	3	7	17.5%
Technology Education *(basic design, simple structure, shapes, creative, practical activities, applied technology, CADD)*	2	3	5	12.5%
Recent Technology *(latest, new, modern etc)*	1	3	4	10%
Electro Type Technology *(electronics, electrical)*	3	1	4	10%
Base Type Technology *(basic, simple, easy concept)*	3	0	3	7.5%
Experimental Type Technology	1	1	2	5%
Engineering Technology	2	0	2	5%
Food & Textile Type Technology	0	2	2	5%
Living Technology *(class theory relevant to real life activities)*	2	0	2	5%
Design *(interior, exterior, landscaping)*	2	0	2	5%
Industrial Arts *(woodwork, metalwork, technical drawing)*	1	0	1	2.5%
Automobile & Mechanic Type Technology	1	0	1	2.5%
Hydroponics Agriculture Type Technology	1	0	1	2.5%
Integrated Application Technology *(combination of technologies)*	1	0	1	2.5%
Own Interest & Choice	1	2	3	7.5%
Total	**25**	**15**	**40**	**100%**

A list of the kinds of technology students would be 'interested' in doing at school is given in the Table 7.10. These different interests show that students have different tastes as shown by the variety of choices indicated. The table also highlighted the students' desire to be independent and to make their own choices in their own areas of interest. The kinds of technology indicated in the table ranges from computing (17.5%) to their own interest choices (7.5%). Educators (17.5%) believed computing would be the students' preference and was described as the 'in-thing' today as supported by the quote given below:

> *The in-thing here is computing. Most of the students are exposed to it but unfortunately we don't have a full time teacher. I have computing in my class but I don't have time to teach it. Only when some students finish earlier than others, then I teach them one or two lessons. Hopefully I'll finish the syllabus and then I will be able to teach computers to them (FJ'VT'F12).*

As indicated by the above quote on computing, there is a genuine concern regarding the lack of qualified teachers in the classroom to teach computing. There was an indication that computing was the 'in-thing' at schools but the subject was hindered due to a lack of qualified computing teachers. Educators (12%) said technology education consists of a basic simple design using the computer and Lego building blocks, moving from simple designs to complex design. Educators here were aware of the deductive sequencing principle of learning which is moving from general to specific as illustrated by the quote given below:

> *I think it is technology education. Learning basic designs and simple structures. Using simple CAD packages on computers. Learning shapes and mechanisms through legos (FJ'HE'F1).*

Educators (10%) also said that recent technology such as sewing would be the type of technology students would be interested in doing at school. In the quote given below, an educator gave an illustration of what was meant by the term 'recent technology' in comparing the two methods of making a shirt using a 30 year old machine and a more recent method of stitching as illustrated in the quote given below:

> *The equipment in school are old models and I think the latest technology would be the ones. For example, this top I am wearing, it is stitched and is done by the latest machines, but with the machines we have which are 30 years old I cannot show students these methods on our machines (FJ'HE'F6).*

Educators (10%) believed electro-type technology would be fascinating to students because students have inquisitive minds as illustrated by an educator's quote given below.

> *Students are very creative and if electronics are introduced students' interest in their projects will increase because they will see what they have designed and create more or do certain things (FJ'IA'M3).*

Educators also argued that introducing new machines such as the electro-type technology would increase students' interest in their projects. Educators (7.5%) also said basic type technology would be interesting to children because they would like to take part in any activity which they think is different and challenging. Educators said that by getting students involved helps to build confidence as illustrated in the quote given below:

> *At very early stages at primary school, students would be interested in taking part in simple technological activities. This is building a solid foundation for future technological knowledge and skills. I think students should be given an opportunity to do problem–solving and allow students to do something with their hands. That creates a lot of interest and builds confidence in students (FJ'Sc'M32).*

Other educators (35%) suggested that students would be interested in studying the following kinds of technologies at school: experimental type technology, engineering technology, food and textile technology, living technology, design, industrial arts, automobile and mechanic type technology, hydroponics agriculture and integrated application technology. The next section will discuss the educators' perceptions of technology education.

7.4 PERCEPTIONS OF TECHNOLOGY EDUCATION

This section discusses educators' perceptions of technology education. Technology education is non existent in Fiji therefore the comments made by educators provided vital information on existing perceptions.

- **Perceptions of technology education**

In Table 7.11 below, educators' commented on their perceptions of technology education.

Table 7. 11: Educators' perceptions of technology education.

Perceptions of technology education	**Educators**		**Total**	**Percentage**
	M	**F**	**N = 40**	**(%)**
Teaching of technology subjects *(education of technology, awareness, technological skills & knowledge, imparting)*	8	7	15	37.5%
Application *(of skills & technological knowledge, combining both theory and practical in teaching)*	8	3	11	27.5%
Learning *(learning new things, moving higher to the next level)*	6	3	9	22.5%
Recent Phenomenon *(new, latest, advance)*	3	2	5	12.5%
Total	**25**	**15**	**40**	**100%**

Educators' perceptions of technology education varied as indicated in Table 7.11. They ranged from teaching of technology subjects (37.5%) to recent phenomenon (12.5%). Again this is an indication of the difference of opinions due to cultures and educator training. Educators' (37.5%) perceived technology education as the teaching of concepts of technology or the application of technology as applied in a work situation as supported by the quote given below:

> *It is the teaching of concepts of technology or the application of technology in every day life and for the work situation (FJ'HE'F23).*

Educators (27.5%) also viewed technology education as the application of theoretical knowledge and skills both in the classroom and to real life situations. Educators believe the use of all these teaching aids is good both for teachers and students, because teachers will explain to students more clearly and students will learn more easily from teachers through the usage of this teaching media. Learning through visual contact is supported by the quote given:

> *Technology education is the application of theory to practice in teaching for example, the use of sewing machines, the use of lathe machines, the various teaching aids or any portable machines or high tech gadgets which we use in our subject areas to help students learn or help teachers get knowledge and skills across to students for them to better understand the subject content (FJ'HE'F38).*

Educators (22.5%) see technology education as gaining technological knowledge and skills. A comparison was made between technology education and technical education in the quote given below. According to educators, technology education is the acquiring of knowledge and skills and learning them with less emphasis on practical activities whereas technical education is actually 'doing work', a practical-oriented subject as illustrated by the quote given below:

> *Technology education to me would be studying technology whereas technical education which is the actual "doing work." Technology education would be studying and learning about technology without too much practical activity (FJ'P/M'M34).*

Educators (12.5%) also view technology education as a recent phenomenon because it is new, modern, the latest and advanced such as computers and other modern high tech machines as illustrated in the quote given below:

> *It is the new machines and modern machines and equipment which are currently in existence for example, computers and other high tech machines (FJ'IA'M9).*

The above description of technology education perceptions show that educators do have a variation of interpretations on technology education. The next section discusses educators perceptions of traditional education.

7.5 PERCEPTIONS OF TRADITIONAL TECHNOLOGY

This section covers educators' perceptions of traditional technology and the usefulness of traditional technology today in Fiji.

- **Perceptions of traditional technology**

Table 7.12 below, shows educators' perceptions of technology.

Table 7. 12: Educators' perceptions of traditional technology.

Perceptions of Traditional Technology	Educators M	F	Total N = 40	Percentage (%)
Cultural Heritage *(those handed down from ancestors, resources)*	15	5	20	50%
Living Technology *(still being practiced today)*	6	4	10	25%
Arts & Crafts *(still being practiced today)*	2	3	5	12.5%
Introduced Skills *(traditional methods prior to high tech today)*	1	2	3	7.5%
Do not know	1	1	2	5%
Total	**25**	**15**	**40**	**100%**

Educators perceived traditional technology in four areas as shown in the table above. This table indicated that even in traditional technology, educators had different opinions. Educators (50%) viewed traditional technology as a cultural heritage because it had to do with tradition and Fijian identity. It is a lifestyle developed by their ancestors as they interacted with their environment. The knowledge and techniques were passed down to the existing generation as illustrated in the quote given below:

> *I think it has to do with tradition. The way our ancestors lived and used things to make life easier for them, for example, building canoes, building houses etc. It is our culture and our identity (FJ'IA'M2).*

Educators (25%) also viewed traditional technology as living technology because it is still being practiced in the village setting. It is a cheap lifestyle because the money economy of urban life does not affect it, however it requires patience to acquire the knowledge and skills. Educators noted that traditional knowledge and skills are no longer valued so much, so not many young Fijians bother to learn about it. However, it is regarded as a living technology because it is still very useful to the rural Fijian community. A typical quote supporting the notion of living technology is given below:

> *It is the old way of doing things in Fijian traditional society which is still being practiced today for example, fishing, farming or building a house. They are cheap and cost nothing but need patience and practice. Nowadays very few people have knowledge and skills but are still very useful in the rural village (FJ'FT'F24).*

Educators (12.5%) thought of traditional technology as arts and crafts because these were the old way of doing things and it tells the story of a tribe. These arts and crafts could be interpreted as the written scripts of each tribe as that they are unique and reflect the identity of a tribe as illustrated by the quote given below:

> *Traditional technology is the old way of doing things as in traditional art, traditional designs and traditional dances. Each are original and unique and contain information about the culture of a tribe. (FJ'IA'M19).*

Educators (7.5%) further viewed traditional technology as introduced skills referring to skills in carpentry, agriculture and cooking which were once introduced but now have become part of the Fijian way of life. These technologies in their nature are not Fijian innovations but over the years may have been influenced by Fijian culture in their methods of application as illustrated by the quote below:

> *To me traditional technology was technology before the advent of the computer. I am talking about applied technology like carpentry, woodwork, cooking and basic agriculture as traditional technology because although they were introduced they have now become part of our way of life. (FJ'M/P/CS'M36)*

Educators' perceptions of traditional technology vary according to interpretation as indicated by the quotes given above. The next section is on the usefulness of traditional technology today in Fiji.

- **Usefulness of traditional technology today**

Table 7.13 below shows educators' perceptions of traditional technology.

Table 7. 13: Usefulness of traditional technology today.

Usefulness of traditional technology today	**Educators**		**Total**	**Percentage**
	M	**F**	**N = 40**	**(%)**
Yes	20	11	31	77.5%
No	2	1	3	7.5
Not sure	3	3	6	15%
Total	**25**	**15**	**40**	**100%**

The majority of Fijian educators (77.5%) believe that traditional technology is still very useful in Fijian society today because of the reasons given in Table 7.12. This is an indication of how Fijians value their traditional technologies. Given below is a typical quote illustrating the practical usefulness of traditional technology today, especially in the rural sector of the Fijian community.

> *Very much so because traditional technology remains very practical and still useful in the rural areas (FJ'IA'M20).*

Educators (7.5%) also said traditional technology was no longer useful, because of introduced technologies which were better than the traditional ones, while 15% said that they were not sure. As more Fijians adopt western technologies they become more alienated from their own traditional technologies. Given below is a typical quote concerning the non relevance of traditional technology today:

> *I don't think traditional technology will be relevant because of the introduced technologies which are common place at home, the work place and in the community today. (FJ'IA'M21).*

This section has given educators' perceptions of traditional technology. The next section is a summary of the findings.

7.6 SUMMARY OF FINDINGS

The following is a summary of the findings of educators' perceptions of technical education, technology, technology education and traditional technology.

This study found that the majority of educators (87.5%) interviewed believed that the existing technical education curriculum in high schools in Fiji needs revision while 12% said it was adequate. The study also revealed educators' perceptions on the purpose of technical education which included: basic education (47.5%), practical education (40%), sustainable knowledge (7.5%), and classroom subjects (5%). When comparing the existing technical education curriculum with other school curriculum, 67.5% of educators said the existing technical curriculum lacks support, emphasis and needs revision and improvement while 25% of educators said the existing technical education curriculum was comparable and well supported. Another 7.5% said it was difficult to compare. On the issue concerning the relevancy of the existing technical curriculum, the study found that 50% of educators said it was relevant while 30% said it was not relevant. The remaining 20% said it was relevant to an extent. The study also found that according to educators, students' level of interest in the existing technical curriculum was slightly higher (40%) as compared to 37.5% who said interest level was low. Other educators (17.5%) found it difficult to compare it with the curriculum while 5% of educators said it was only popular only to an extent. The study also found that educators would like to acquire further knowledge in other subject areas which could help in the teaching of technical subjects. The areas chosen were as follows: related areas (40%), computing (35%), recent phenomenon (12.5%) and other classroom subjects (12%).

In identifying weaknesses of the technical curriculum, 100% of educators said the main weaknesses were mainly due to the following; resources, linkage to further education, support, coordination, continuity, hands on experience coupled with a negative attitude, obsolete curriculum, does not cater for the countries needs, implementation problems and the adoption of a foreign curriculum. The main suggestion made by educators (32.5%) to improve technical education was a revision of the existing technical education curriculum. Other suggestions included; general suggestions (20%), training of quality teachers (10%), support areas (10%), establishing a linkage between primary (5%), recruitment of quality students (5%), establishing experts and a resource pool (2.5%), better coordination mechanisms (2.5%), a continuous in-service training program (2.5%), produce local materials (2.5%), establish a revolving fund (2.5%), establish a mobile technology unit (2.5%) and scrap subject division (2.5%).

The research also found that educators' perceptions of technology varied as shown in the following list; recent phenomena (27.5%), process (22.5%), application (20%), artefacts (15%), hardware and systems (10%), and improved efficiency (2.5%). The study also found that the kind of technology students would be 'interested' in doing at school also varied widely from the highest group choosing computing (17.5%) as being the most popular to the lowest group being integrated application technology (2.5%) which would be the least popular. The study also looked at educators' perceptions of technology education and found that educators' views again varied widely as shown in the following categories: teaching of technology subjects (37.5%), application (27.5%), learning (22.5%) and, recent phenomenon (12.5%). The study also revealed educators' perceptions of traditional technology as cultural heritage (50%), living technology (25%), arts and crafts (12.5%) and introduced skills (7.5%). Only 5% of the educators said they were unaware of traditional technology. On the issue of usefulness of traditional technology today, 77.5% of educators said it was still useful while 7.5% said it was not useful. Only 15% said they were not sure.

This chapter has provided the findings concerning educators' perceptions of technical education, technology, technology education and traditional technology in Fiji. The next chapter (chapter 8) will focus on students' perceptions of technical education, technology and traditional technology in the Solomon Islands.

CHAPTER 8

STUDENTS' PERCEPTIONS OF TECHNICAL EDUCATION, TECHNOLOGY AND TRADITIONAL TECHNOLOGY IN THE SOLOMON ISLANDS

Interviewing is part of the day-to-day activity of a wide range of occupations, especially those concerned with service to people. Daphine M. Keats, (1993).

8.1 INTRODUCTION

The previous chapter discussed educators' perceptions of technical education, technology, technology education and traditional technology in Fiji. This chapter will focus on students' perceptions of technical education, technology and traditional technology in the Solomon Islands. The interview sample of students for this chapter is 40 of which 26 were males and 14 were females. Students' interviewed were from Form 2 to Form 5.

According to Hood (1998) students are the consumers of education therefore a school's curriculum should be designed to meet their needs and expectations. It was for this reason that students' perceptions were obtained. Students who are the consumers of the curriculum development process are often left out. It is important that they be involved in this process because they are often the victims. Butterworth and Butterworth (1998) also highlighted the concept of consumers and customers in curriculum planning and development. The immediate consumers and customers of curriculum innovation and development were the students. Hass (2000) stated that students should share in setting goals and objectives of curriculum planning because students are the main stakeholders. Students are in the best position to explain many of the advantages and deficiencies of the present curriculum. He further argued that research has shown many times that learning is significantly improved when students share in planning and evaluating curriculum.

This chapter is divided into six sections. The remainder of this chapter reports on:

8.2 Subject Choice and Students' Reasons for Subject Choice.

8.3 Perception of Existing Technical Education.

8.4 Perceptions of Technology.

8.5 Perception of Traditional Technology.

8.6 Summary of Findings.

8.2 SUBJECT CHOICE AND STUDENTS' REASONS FOR SUBJECT CHOICE

This section covers: subject choice, reasons for subject choice, career choice, subject choices preparing students for future careers, usefulness of subject choice to future career, career influences and other things students would like to learn at school. Table 8.1 given below is only for background information.

- **Subject Choice (subjects students took at high school)**

Table 8.1 identifies student subject choices at high school

Table 8. 1: Subjects students interviewed took at high school.

Subject Choice	Students M	Students F	Total N = 40	Percentage (%) 100
English	25	15	40	100%
Maths	21	15	36	60%
Social Science	19	11	30	50%
Science	17	9	26	43%
Bible Knowledge	6	10	16	27%
Business Studies	7	5	12	20%
Industrial Arts (woodwork)	12	0	12	20%
Agriculture Studies	7	2	9	15%
Home Economics	0	7	7	12%
Chemistry	2	4	6	10%
Biology	2	4	6	10%
Physics	2	4	6	10%
Accounting	4	2	6	10%
Geography	5	1	6	10%
Economics	5	1	6	10%
Arts & Craft	0	2	2	3%
History	2	0	2	3%
Subject Choice	**26**	**14**	**40**	**100%**

The table above showed subjects students took at school. English has a 100% enrolment and is the language used in schools. Maths is also important but only has a

60% level of enrolment. English and Maths are prerequisites for careers like medicine and engineering. Social science subjects are popular (50%) because students relate to them. The science subjects (physics, chemistry, biology) were rated highly (43%) because they are seen as academic subjects. Although the Solomon Islands is a Christian country, Bible Knowledge is optional. Technical subjects (home economics, industrial arts etc) are streamed and gendered. There was an indication in the table which suggested that subject choice tended to be based on academic subjects.

- **Reasons for subject choice**

Table 8.2 highlights the students' reasons for subject choices.

Table 8. 2: Students reasons for enrolling in high school subjects.

Reasons for subject choice	Students M	F	Total N = 40	Percentage (%)
Requirements *(compulsory, part of the curriculum, school system, syllabus)*	18	9	27	67.5%
Interest & Enjoyment	2	3	5	12.5%
Future Career	3	1	4	10%
Provide Background Knowledge *(basic foundation education)*	3	1	4	10%
Total	**26**	**14**	**40**	**100%**

Students' reasons for subject choice was divided into four main areas as indicated in the table above. According to students (67.5%) subject choice was highly influenced by the requirements set out by the education system and the Ministry of Education. Six student quotes illustrating this point are given below:

> *They are part of the school curriculum (SI'Sc'F17).*

> *I am taking those subjects because it is required by the school system (SI'Sc'M20)*

> *They are part of the school system (SI'Ag'M29).*

> *Because they are a required part of the school system in this school (SI'HE'F37)*

> *I enrolled in these subjects because they are compulsory subjects and so I have to do all of them (SI'Sc'F7).*

> *They are compulsory and others are optional in the school system (SI'Arts'M39)*

Students (12.5%) also said that their reasons for subject choices are that they were interested in and enjoyed the subjects they took in high school as illustrated by the quote given below:

> *Because I just enjoy doing them ((SI'BS'F1)*
>
> *I want to major in science as I am interested in science subjects (SI'HE'M14).*

Students (10%) said their future career was the driving force behind subject choices as illustrated in the students' quote below:

> *To be a science teacher I had to take science subjects to qualify (SI'Sc'M4)*

Students (10%) also stated that the reason for subject choice was because the subjects taken provided basic background education as illustrated by the quotes given below:

> *I like those subjects as they provide me with a good foundation for later years (SI'Sc'M32)*
> *They will provide me with basic skills for my future career (SI'IA'M35)*

The next section will cover career choices.

- **Career choices**

Table 8.3 identifies students' future career choices

Table 8. 3: Students' future career choices.

Career Choice	Students M	Students F	Total N = 40	Percentage (%)
Engineering & Building Industry *(motor mechanic, rural engineer, electronic s engineer, carpenter, architect)*	10	0	10	25%
Teaching Profession *(teacher, scientist)*	5	3	8	20%
Business Profession *(Accountant, economist, computing)*	4	4	8	20%
Medical Profession *(doctor, nurse, pharmacist, dentist)*	5	2	7	17.5%
Food Technology *(dietitian, nutritionist)*	0	3	3	7.5%
Agronomist *(agriculture officer, agriculturist)*	1	1	2	5%
Others *(lawyer & politician)*	1	1	2	5%
Total	**26**	**14**	**40**	**100%**

The above table listed students preferred future career choices. Twenty-five percent of students wanted to be in the engineering and the building industry because of the need for these qualifications in the country, and to follow traditions as indicated by the two quotes given below:

> *I want to become an engineer so that I can help design buildings and bridges. The Public Works Department needs engineers in all its department (SI'IA'M9).*
>
> *I want to become an architect. My father is a carpenter and he usually draws plans and I help him. I want to help my father when I complete my study (SI'IA'M21).*

Students (20%) said they wanted to join the teaching profession because of an interest in it and its' usefulness for the future as illustrated by the quote given below:

> *I am a science major but I'm also interested in becoming a teacher in Industrial Arts because I want to be able to repair anything in my own house in the future (SI'Sc'M32).*

Students (20%) said they wanted to be in the business profession because accounting was a family profession and because they wanted to work for the government as illustrated in the two quotes given below:

> *I am thinking of becoming an accountant because I am good at Maths and also because my dad is an accountant and I want to be like him (SI'HE'F10).*

> *I want to be an economist because I want to work for the government as an economist (SI'Arts'M38)*

The medical profession was attractive to students (17.5%) because they said there is a need for this profession in the country as illustrated by this quote given below:

> *I'd like to become a medical doctor because I can see there is a great need for it in the country today (SI'Sc'M3).*

Students (7.5%) were interested in becoming food technologists and nutritionists because they said it would be helpful to them personally as illustrated by the quote given below:

> *I want to become a nutritionist because firstly, since I am sickly or said to be sickly, I want to learn more about what food is good for me so I can help myself and secondly I can help others to eat the correct type of food and not to be sickly like me (SI'Sc'F13).*

Other students (10%) wanted to become agronomist and lawyers because the country needs these two professions.

The next section covers subject choices in preparation for a future career.

- **Subject choices in preparation for a future career**

Table 8.4 shows students' perceptions of subject choices in preparation for their future careers.

Table 8. 4: Students' subject choice in preparation for a future career.

Subject choice in preparation for a future career	**Students** M	F	**Total** N = 40	**Percentage** (%)
Yes	20	8	28	70%
No	3	4	7	17.5%
To an Extent	3	2	5	12.5%
Total	**26**	**14**	**40**	**100%**

The table above shows students' perceptions on subject choice in preparation for a future career. Seventy percent of students said that the courses they enrolled in prepare them for their future career as illustrated by the two quotes given below:

> *Yes, I think it does prepare me for my future career (SI'Sc'F7).*

> *I believe it does. It helps broaden my understanding of what I want to become in the future (SI'IA'M36).*

Students (17.5%) said subject choice at high school does not prepare them for their future careers as illustrated by these two quotes:

> *No, I don't think so. They need to be more relevant and appropriate (SI'HE'F2).*

> *Not really but it gives me good foundation knowledge (SI'HE'F10)*

Another 12.5% of students said the courses they took in high school only prepare them partially for their future career which means that the subject is not necessarily relevant as illustrated in the quote given below:

> *In my view the courses I am now taking only prepares me partially for my future career. It may be useful for the next level in school but for my future career only to an extent. (SI'Sc'F13).*

The next section is about the usefulness of subject choices to future careers

- **Usefulness of subject choices to future careers**

Table 8.5 revealed students' perceptions of the usefulness of subject choice to future careers.

Table 8. 5: Usefulness of subjects choices to future careers

Usefulness of subject choices to future careers	**Students** M	F	**Total** N = 40	**Percentage** (%)
Useful *(meeting peoples need)*	23	12	35	87.5%
Not Useful	1	0	1	2.5%
Unsure	2	2	4	10%
Total	**26**	**14**	**40**	**100%**

The majority of students (87.5%) believed that subject choices in high schools were useful to future careers. Useful in the sense that it enables them to continue to the next level or to earn a paying job. A quote supporting this notion is given on below:

> *The subjects I am now taking are not about law but these are building the ground work so that I can go and study law (SI'HE'F2).*

One student (2.5%) said the subjects were not useful for the students' future career as illustrated in the quote given below:

Not very useful because my career is not in the subjects I am now taking (SI'Arts'M26)

Ten percent of students said they were unsure of the usefulness of subject choice to their future career as illustrated in the quotes given below:

I don't know (SI'Sc'M6).

I don't really know at the moment (SI'HE'F10).

The next section covers career influence.

- **Career influence** (The influences on decision-making for future career choice)

In Table 8.6 students commented on influences on decision-making for their future careers.

Table 8. 6: Influence on future career choice.

Career Influence	**Students**		**Total**	**Percentage**
	M	**F**	**N = 40**	**(%)**
Own Decision	16	11	27	67.5%
Other's Influence *(parents & relatives)*	10	3	13	32.5%
Total	**26**	**14**	**40**	**100%**

Students' career choices were influenced and divided into two categories: students' own decision and decisions influenced by others. Two typical quotes by students (67.5%) indicating decisions made by themselves is given below:

I chose this course myself (SI'Sc'F13).

I made the decision (SI'IA'M22).

Students (32.5%) also said that other people helped them in decision-making. A typical quote on career choice being influenced by others is illustrated in the two quotes given below:

My parents helped me (SI'Ag'M31).

My dad (SI'Arts'F15).

The next section will cover other things students would like to learn at school.

- **Other things students would like to learn at school**

In Table 8.7 below students commented on other things they would like to learn at school.

Table 8. 7: Other things students would like to learn at school.

Other things students would like to learn at school.	Students M	F	Total N = 40	Percentage (%)
Computing *(CADD LT)*	7	3	10	25%
Arts Subjects *(Sports, Music, Culture, Arts & Drawing)*	7	3	10	25%
Technology Subjects *(Industrial Arts, T/D, motor mechanics)*	5	3	8	20%
Business *(accounting)*	3	1	4	10%
Food Technology Subjects *(Home Economics, cooking)*	1	2	3	7.5%
Science Subjects	0	1	1	2.5%
Total	**26**	**14**	**40**	**100%**

Students listed the above subjects as things they would like to learn at school. Students (25%) said computing is important because it is in demand today as illustrated in the quote given below:

> *Computing is very demanding these days therefore I need to be familiar with it (SI'Sc'M40).*

Students (25%) said they would like to learn arts subjects which included sports, music, culture, arts and drawing because it is a healthy way of living as illustrated by the quote given below:

> *I'd like to learn music and sports. Music and sports are both international languages which can help people understand each other better. Music and sports help me to relax between my studies (SI'IA'M8).*

Students (20%) also said they would like to learn technology subjects which included industrial arts, technical drawing and motor mechanics because they were seen as useful in life as illustrated in the quote given below:

> *What I really want to learn in school is technical drawing. I got a chance to do it up until Form 4 but that was cut short when I was just beginning to take an interest in it and understand it. You see, I went on to Form 5. My school does not offer T/D up to Form 5 & Form 6. I would have continued up to Form 7. I took an interest in T/D because it includes design concepts and when you understood the concepts, it was easy to follow and draw (SI'Sc'M14).*

Students (10%) were also interested in learning business in school because business principles can be applied to any situation as shown in the students' quote given below:

> *I'd like to learn how to deal with business, because if you are not employed you can still start your own business (SI'HE'F25).*

Students (7.5%) said they were interested in learning food technology which includes preparation and baking food in the earthen oven as illustrated by the quote given below:

> *I would like to learn the traditional way of baking food in the earth oven because I grew up in town and I did not learn and wasn't shown how to do it. I did not have the opportunity of growing up with a mother like the other girls. My parents separated, so when I came to this school I decided to take Home Economics to learn home training to prepare myself for my own future and to manage my own home. (SI'Sc'F13).*

The next section will deal with students perceptions of technical education.

8.3 PERCEPTIONS OF TECHNICAL EDUCATION

This section covers a comparison of technical subjects with other school subjects, students' level of interest in technical subjects and the relevance of technical education.

- **Comparison of technical subjects with other school subjects**

In Table 8.8 students made a comparison of technical subjects with other school subjects.

Table 8. 8: Students' comparison of technical subjects with other school subjects.

Comparison of technical subjects with other school subjects	Students M	F	Total N = 40	Percentage (%)
Useful & needs improvement *(link, recognition, attention, emphasis, apply theory with practical, lacked qualified teachers, important, helpful, complicated, progressing, adequate)*	25	13	38	95%
Prepare Citizens for future life *(Learning many things)*	1	1	2	5%
Total	**26**	**14**	**40**	**100%**

Students (95%) in their comparison of technical education subjects with other school subjects said that technical education subjects is useful and needed improvement as illustrated by the two quotes given below:

> *It needs improvement to adequately cater for Solomon Islands lifestyle (SI'Sc'M32).*

> *I think they are useful because they teach us something about life (SI'Sc'F5)*

The next section will discuss the level of popularity of technical subjects as perceived by the students.

- **Level of interest in technical education subjects**

Table 8. 9: Students' perceived level of interest in technical subjects.

Table 8.9 shows students' level of interest in technical subjects.

Level of interest in technical subjects.	Students M	F	Total N = 40	Percentage (%)
No, Not Interested In.	12	7	19	47.5%
Yes, Interested In.	7	5	12	30%
Optional	5	1	6	15%
Not Sure	2	1	3	7.5%
Total	**26**	**14**	**40**	**100%**

Students (47.5%) in the Solomon Islands said that level of interest in technical education subject was low. Student said that the reasons for this were that the school does not emphasize and does not make the technical education curriculum compulsory as illustrated by the quote given:

> *Not many students go for them because the school and the system does not put an emphasis on it and does not make technical subjects compulsory in Form 4 to Form 5 (SI'Arts'M16).*

However 30% of students said that there was a high level of interest in technical subjects and that they fulfilled their aspirations for future careers as illustrated by the quote given below:

> *Yes it is to an extent, when students see it fulfil their future requirements (SI'HE'F23).*

Fifteen percent of students said technical subjects were classified as optional which means that they are not compulsory and not examinable. For these reasons students don't see them as important as illustrated by this quote given below:

> *No, because students don't take their option subjects seriously. They just do subjects that would come in the test like Maths and English (SI'BS'F1).*

The remaining 7.5% of students said they were not sure whether technical subjects were popular or not as illustrated by the quote given below:

> *I don't really know. I am saying this because it will depend on the student whether they are interested or not (SI'Sc'M20).*

The next section will deal with the perceived relevance of the existing technical education curriculum.

- **Perceived relevance of the existing technical education curriculum**

Table 8.10 shows students' perceptions of the relevance of the existing technology education curriculum.

Table 8. 10: Students' perceived relevance of the technical education curriculum.

Perceived relevance of the existing technical education curriculum	Students M	F	Total N = 40	Percentage (%)
Relevant	22	14	36	90%
Relevant in some parts only	4	0	4	10%
Total	**26**	**14**	**40**	**100%**

The majority of students (90%) said the technical education curriculum was relevant to the country because it was beneficial as illustrated by the quotes given below:

> *It is appropriate because the country will benefit from it (SI'BS'F1).*
>
> *The technical education curriculum is very relevant but in our system a subject such as home economics is only optional. You will need to decide whether to take or not (SI'Sc'M11)*
>
> *Before the technical education curriculum was not relevant, but now I think it is very relevant because technology is becoming very common and what we learn is really important today (SI'Sc'M14)*

Only four students (10%) said some parts of the technical education curriculum were relevant while other parts were not, as illustrated by the quote given below:

> *Not all technical subjects are relevant. Some still teach old materials (SI'Arts'M39)*

The next section deals with students' perceptions of technology.

8.4 PERCEPTIONS OF TECHNOLOGY

This section covers perceptions of technology, examples of things students see as technology, reasons for choosing these examples as technology, reasons for liking technological things, the kind of technology students would like to learn in school, the kind of technology younger children would be interested in doing at school and perceptions of doing technology.

- **Perceptions of technology**

Table 8.11 reveals students' perceptions of technology

Table 8. 11: Students' perceptions on technology.

Perceptions of technology	Students M	F	Total N = 40	Percentage (%)
Application *(techniques, creating, development, improves life)*	12	6	18	45%
Recent Phenomenon *(new, latest, modern, introduced, foreign, special, amazing etc)*	11	3	14	35%
Artefacts *(machines, tools , gadgets, equipment)*	3	5	7	17.5%
Total	**26**	**14**	**40**	**100%**

Students' perceptions of technology were divided into three categories, namely: application, recent phenomenon and artefacts. Students (45%) perceived technology as application as illustrated in the quotes given below:

> *Technology to me is the different techniques we use today, to improve the standard of living (SI'Sc'F7)*
>
> *Technology is the application of knowledge and instructions given by teachers. The skillful use of hands to construct a project completes the process of application (SI'IA'M18).*
>
> *Technology is the development of things such as roads, bridges and dams (SI'Ag'M30)*

Students (35%) perceived technology as recent phenomenon from the old to new, recent or modern as illustrated with the quotes illustrated below:

> *The word technology to me means new things, new tools and new ways of improving living standards. Other examples of new things are machines, vehicles, transportation systems, the TV monitors and video decks, electrical appliances, new glass materials and portable machines used in industrial arts (SI'IA'M9).*
>
> *To me technology means changing of things from old to new like from a leaf house to an iron roof house (SI'Arts'M26).*

Students (17.5%) also viewed technology as artefacts which involves machines, machine related things and equipment which is illustrated by the quotes given below:

> *When people mention technology I think of equipment like electronics. Your cassette tape recorder here would be one of them. Others things would include cars, houses and the different design of planes (SI'Sc'M14).*
>
> *To me technology are things which were machine driven like trucks, bulldozers, planes and boats. Technological things depend on power to drive the machines and power comes from burnt fuel (SI'Arts'F15)*

The next section will cover examples of things students see as technology.

- **Examples of things students perceived as technology**

In Table 8.12 students identified examples of things they perceived to be technology

Table 8. 12 list the examples of things students perceived as technology.

Examples of things students perceived as technology	Students M	Students F	Total N = 40	Percentage (%)
Transport *(plane, boat, canoe, cars, trucks etc)*	10	1	11	27.5%
Computer *(high tech etc)*	3	4	7	17.5%
Shelter *(dwelling, house, school etc)*	5	0	5	12.5%
Fishing *(diving, fishing spear, goggles etc)*	3	1	4	10%
Artefacts *(a product of human arts and workmanship)*	2	0	2	5%
Farming *(tools, machinery etc)*	1	1	2	5%
Kitchen ware *(cooking utensils, stove etc)*	0	2	2	5%
Medical *(equipment, gears, tools etc)*	0	2	2	5%
Stationery *(books, pencils etc)*	0	1	1	2.5%
Communication *(TV, radios etc)*	0	1	1	2.5%
Engineering *(roads and bridges etc)*	0	1	1	2.5%
Sports *(facilities, stadium, racing track etc)*	1	0	1	2.5%
Textile *(sewing, knitting etc)*	1	0	1	2.5%
Total	**26**	**14**	**40**	**100%**

Students saw a lot of things around them as technology and in Table 8.12 students gave some examples of what they see as technology. Students (27.5%) said transportation of all sorts, such as cars, boats and out-board motors were some examples. A quote supporting the use of transport as technology is given below:

> *An outboard motor on a canoe to travel from one village to another village by sea (SI'IA'M22).*

Students (17.5%) selected computers as one example of technology. Students viewed it as the latest technology which has become part of the work force as illustrated by the quote given below:

> *I think it is computers because it is the latest technology. It has now become part of the work culture of the Solomon Islands today(SI'HE'F23).*

Students (12.5%) chose shelter as technology that is, the making of houses and the methods of building houses as demonstrated by the quote given below:

> *The making of houses and the methods used to build houses we see around us today (SI'Sc'M6).*

Students (10%) chose fishing as an example of technology. There were different methods of fishing as illustrated in the quote given below:

> *I would say fishing is an example of technology. There are many ways of catching fish. We have the western methods and our own traditional methods. (SI'Arts'F15).*

Students (5%) also chose artefacts as examples of technology which included machines and machine related things as illustrated in the quote given below:

Machinery like bulldozers, graders, chainsaws and those used in workshops (SI'IA'M8).

Students (5%) selected farming machines, equipment and tools as examples of technology. This is illustrated in the quote given below:

The machines in the farm like the tractors, rotor and the plough (SI'HE'F10).

Students (5%) chose kitchenware as examples of technology. These were cooking appliances like the electric stove and other electrical appliances as illustrated by the students quote given below:

Cooking utensils in the kitchen and the electrical appliances used in food preparation (SI'Sc'F5).

Students (5%) selected medical equipment as examples of technology as illustrated in the students' quotes given below:

The equipment used by doctors on sick people (SI'Sc'F27)

Students (12.5%) also listed other things for example, stationery, communication, engineering, sports and textiles as examples of technology.

The next section will discuss reasons for choosing these examples as technology.

- **Reasons for choosing the previous examples as technology**

In Table 8.13 students explained their reasons for selecting the previous examples as forms of technology.

Table 8. 13: Reason for choosing the previous examples as technology

Reasons for choosing examples as technology	Students		Total	Percentage
	M	F	N = 40	(%)
Improved Efficiency *(faster, easier, speed)*	9	6	15	37.5%
Recent Phenomenon *(new, modern, latest)*	9	3	12	30%
Man-Made Product *(artefacts)*	4	2	6	15%
Fascinating *(different, attractive, fantastic & awesome)*	3	2	5	12.5%
Application *(being practical)*	1	1	2	5%
Total	**26**	**14**	**40**	**100%**

Table 8.13 above listed students' reasons for choosing the examples in Table 8.12 as technology. Students' (37.5%) reasons for choosing these examples as technology was because of improved efficiency such as speed, ease of use in assisting humans in work. Two typical quotes to illustrate improved efficiency are given below:

Because they are fast and quicker (SI'BS'F1)

They makes life easier and comfortable (SI'Ag'M31)

The second reason given by students (30%) was recent phenomenon which implies new, modern and the latest technology as illustrated by the quote given below:

Well I think of it as the computer. They are so new, so modern and so fast in sending messages (SI'Sc'M6).

Another reason given by students (15%) for selecting the previous examples as technology was man-made products. This is illustrated by the quote given below:

Because a boat is a product built by man. It was first designed then constructed. (SI'Sc'F7).

The next reason given by students (12.5%) for choosing the previous examples as technology was fascination because they were different, attractive, fantastic and awesome as illustrated in the quote by a student given below:

Their design fascinates me and is interesting to see (SI'Sc'F33)

The following reason students (5%) gave for selecting previous examples as technology was application. The student quote given below illustrates this notion:

Because their application to work makes it easier for us for example, the computer. They are also very easy to operate (SI'Sc'F5)

The next section is about reasons for liking technological things.

- **Reasons for liking technological things**

In Table 8.14 students revealed their reasons for liking technological things

Table 8. 14: Students' reasons for liking technological things

Reasons for liking technological things	**Students M**	**F**	**Total N = 40**	**Percentage (%)**
Improved Efficiency *(makes life easier, fast, quick, efficient, comfortable, better)*	17	9	26	65%
Useful & Beneficial *(helpful, practical, makes life easier)*	3	4	7	17.5%
Recent Phenomenon *(new, latest, up-to-date, current, modern)*	6	0	6	15%
Aesthetic *(scaled and well proportioned, good finishing, elegant, tasteful, fascinating, different)*	1	1	2	5%
Total	**26**	**14**	**40**	**100%**

Table 8.14 showed students' reasons for liking technological things. The first reason students (62.5%) mentioned for liking technological things was improved efficiency as illustrated by the quotes given below:

I like them because they make things in life easier (SI'HE'F2)

They make life easier for example, an electrical light, you just press the switch and the light and power comes on. The same can be said of the video deck (SI'IA'M9)

They are very efficient and fast (SI 'Arts' M38)

Students (17.5%) stated they also liked technological things because they are useful and beneficial to life as illustrated with the quotes concerning the computer below:

Computers helps us in our school work (SI'SC'F34)
They are beneficial to us in our life to day (SI'Arts'M24)

Students (15%) also commented that they liked technological things because they are new, modern and the latest on the market. These descriptions are listed under the title recent phenomenon as illustrated by this student quote given:

They are modern and better (SI'Ag'M29)

Because the latest things like TV and radio can tell us about what is happening around the world (SI'SC'M4)

Students (5%) also liked technological things because they are aesthetically pleasing as illustrated by this student's quote:

They are clean and beautiful to look at (SI'HE'F37)

The next section will discuss the kinds of technology students would like to learn at school.

- **Kinds of technology students would like to 'learn' at school**

Table 8.15 identifies the kinds of technology students would like to learn at school.

Table 8. 15: Kinds of technology students would like to learn at school.

Kinds of technology students would like to learn at school	Students M	Students F	Total N = 40	Percentage (%)
Computing	7	5	12	30%
Electronics & electrical things	6	3	9	22.5%
Industrial Arts *(T/D, wood, furniture making, carpentry)*	4	2	6	15%
Designing & Project Making	4	1	5	12.5%
Architecture	2	1	3	7.5%
Home Economics	2	1	3	7.5%
Mechanics	1	1	2	5%
Total	**26**	**14**	**40**	**100%**

Students in the table above list the kind of technology they would like to learn at school. Students' (30%) first choice was computing because they saw it as a necessary part of life today as illustrated in the quote given below:

Computing because it is a necessary part of a modern lifestyle today (SI'Sc'F5)

Students (22.5%) mentioned again that electronics and electrical things interest and fascinate them and they would like to learn them as supported by the quote given below:

> *I am also interested in electronics circuit boards (SI'Sc'M14).*

Students (15%) also stated that they would like to learn industrial arts or aspects of industrial arts for example, woodwork, metal work, technical drawing and carpentry as illustrated in the quote concerning technical drawing given below:

> *Technical Drawing, because it will help me when I want to draw plans for houses (SI'IA'M22)*

Students (12.5%) also commented that they would like to learn designing and project making in school as shown in the quote given below:

> *I am interested in designing technology like in house building (SI'Arts'M12)*

Students (7.5%) again said they would like to learn architecture in school as illustrated in the quote given below:

> *Architecture because I am interested in the designing and planning of buildings (SI'Arts'F15).*

Students (7.5%) also said they would like to learn home economics in school as illustrated in the quote given below:

> *Home Economics because I'd like to learn how to sew (SI'HE'F10).*

Students (5%) further said they would like to learn mechanics and be able to fix cars in school as illustrated in the quote given below:

> *I am interested in motor mechanics because I want to be like my dad (SI'Sc'M40).*

The next section will discuss the kind of technology students would be interested in doing at school.

- **Kinds of technology students would be 'interested' in doing at school**

In Table 8.16 students identified the kind of technology students would be interested in doing at school.

Table 8. 16: Kinds of technology students would be interested in doing at school

Kinds of technology students would be interested in doing at school.	**Students M**	**F**	**Total N = 40**	**Percentage (%)**
Computer *(business)*	8	6	14	35%
Electronics *(robotics)*	2	3	5	12.5%
Wood & Metal Technology	4	1	5	12.5%
Inventive Type Technology *(motor mechanics)*	3	1	4	10%
Designing & Project Making	2	1	3	7.5%
Hydroponics Agriculture *(farming)*	2	1	3	7.5%
Home Economics *(cooking)*	2	0	2	5%
Fishing *(old & new methods)*	2	0	2	5%
Own Choice *(depends on interest, based on gender biased subjects)*	1	1	2	5%
Total	**26**	**14**	**40**	**100%**

The kind of technology students would be interested in doing at school varied widely. Students (35%) said they would be interested in doing computing at school as illustrated by the quote given below:

> *I think computers will be interesting for them because it is the latest technology (SI'Sc'F34).*

Students (12.5%) commented they would be interested in doing electronics at school. Electronics has become part of the technology curriculum in the Solomon Islands and this could have created interest in that area. Two typical quotes supporting electronics as an area of interest for children are given below:

> *Something that attracts their attention like electronics (SI'Sc'F5)*

> *I think it is electronics because it is now part of the design and technology curriculum in the high schools (SI'HE'F23).*

Students (12.5%) also stated that they would be interested in doing wood and metal technology at school as illustrated by the quote given below:

> *Making something useful for their home like chairs and tables out of wood (SI'Arts'M39)*

Students (10%) also mentioned that they would be interested in doing inventive type technology because this would give them the opportunity to be creative as illustrated by the quote given below:

> *Inventive type technology where children were given chances to be creative (SI'Sc'M3)*

Students (7.5%) further said that they would be interested in doing designing and project making as illustrated by the quote given below:

> *I think technology in designing will interest the children. (SI'IA'M8).*

Students (7.5%) also suggested that they would be interested in doing hydroponic agriculture because it is a new farming technology in the Solomon Islands and according to students it is a cleaner way of farming than the old soil method as illustrated by the quote given below:

> *I think it would be hydroponics agriculture where vegetables are grown in water. This is a new direction and a cleaner method than the old method of farming (SI'Arts'M38).*

Other students (10%) commented that they would be interested in doing home economics and fishing at school. Two students (5%) said that students should be given the freedom of choice.

The next section will cover perceptions of doing technology at school.

- **Perceptions of doing technology at school**

Table 8.17 reveals students' perceptions of doing technology at school.

Table 8. 17: Solomon Islands students' interpretation of the phrase doing technology.

Perceptions of 'doing technology' at school	Students M	Students F	Total N = 40	Percentage (%)
Application of Practical Activities *(process, making with hands, building, creating, helping)*	13	6	19	45.5%
Broadening & Improvement of Knowledge & Skills *(understanding, learning, improving)*	10	4	14	35%
Preparation for Future *(knowing, training)*	3	4	7	17.5%
Total	**26**	**14**	**40**	**100%**

The phrase doing technology at school is the main point of discussion here. Students' perceptions of doing technology included things such as the application of practical activities, broadening and improvement of knowledge and skills and preparation for the future.

Students (45%) perceived doing technology as the application of practical activities such as doing things using their hands as illustrated by the student quote given below:

> *It is doing practical activities such as preparing a dish of pudding (SI'Sc'F7)*

> *It is a practical application when fixing a machine or repairing a bicycle (SI'Sc'M14).*

Students (35%) said doing technology was broadening and improvement of knowledge and skills as illustrated by the quote given below:

Doing technology at school would mean broadening and improving basic knowledge and skills while doing or taking part in activities (SI'Sc'F15).

Learning and be exposed to new things (SI'IA'M22)

Students (17.5%) stated that doing technology was perceived as a preparation for the future. It can also mean training for the future as illustrated by the student quote given below:

It means training us for the future (SI'HE'F2).

The next section will look at students' perceptions of traditional technology

8.5 PERCEPTIONS OF TRADITIONAL TECHNOLOGY

This section covers knowledge of traditional technology, examples of traditional technology, reasons for learning traditional technology and usefulness of traditional technology today.

- **Knowledge of traditional technology**

In Table 8.18 students commented on their knowledge of traditional technology.

Table 8. 18: Students' knowledge of traditional technology in their own culture.

Knowledge of traditional technology	Students		Total	Percentage
	M	F	N = 40	(%)
Yes	25	13	38	95%
No, did not know	1	1	2	5%
Total	**26**	**14**	**40**	**100%**

According to the table above Solomon Islands students (95%) said they knew about traditional technology or have knowledge of it as illustrated by the quotes given below:

Definitely although it is slightly changing in my time. For example, when I was a child my mama told me that in the past they didn't use modern tools like axes or knives, what they used were sticks and stones, but these are no longer in use but that is a part of the change in technology (SI'IA'M8).

I think traditional technology is what I would call "natural technology" because it is technology which our people have grown up with without thinking about it because it is part and partial of our traditional lifestyle. For example, some of our girls here know how to weave basket out of coconut fronds or pendanus leaf since their childhood days and its natural for them therefore for me traditional technology is natural technology (SI'Sc'F13).

Yes, we have traditional technology. An example is the fish hook made from a sea shell (SI'Sc'M20)

Five percent of students said they did not know about traditional technology because they grew up in town and not in the village as illustrated by the quotes given below:

Maybe but I grew up in town so I am not familiar with traditional technology (SI'HE'F28).

The next section deals with examples of traditional technology.

- **Examples of traditional technology**

In Table 8.19 students gave a list of examples of traditional technology.

Table 8. 19: A list of examples of traditional technology

Examples of traditional technology	Students M	F	Total N = 40	Percentage (%)
Making of canoes	5	3	8	20%
Fishing methods & techniques	6	1	7	17.5%
Traditional houses	4	2	6	15%
Preservation of food	2	1	3	7.5%
Weaving mats & hats	2	1	3	7.5%
Farming methods	2	1	3	7.5%
Preparation of herbal medicine	2	0	2	5%
Stone axe & digging sticks	1	1	2	5%
Preparation and cooking of food	1	1	2	5%
Bows & arrows	1	0	1	2.5%
Stone carving	0	1	1	2.5%
Making of traditional musical instruments	0	1	1	2.5%
Bird's traps & snares	0	1	1	2.5%
Total	**26**	**14**	**40**	**100%**

In Table 8.19 students gave a list of examples of traditional technology. Students (20%) said that the making of a traditional canoe is an example of traditional technology which they have knowledge of as illustrated in the quote given below:

Yes the making of traditional canoes (SI'IA'M35)

Students (17.5%) said that fishing methods and techniques were examples of traditional technology as illustrated in the quote given below:

I grew up in town but I think I can remember my father taking me fishing using a bush vine to round up the fish (SI'Sc'F34)

Students (15%) stated that traditional houses and methods of building houses were examples of traditional technology as illustrated by the student's quote given below:

Yes like the technology in building houses (SI'IA'M22).

Students (7.5%) said that preservation of food were examples of traditional technology as illustrated by the quote given below:

Yes, the preservation of food by digging a hole and burying it (SI'Ag'M31).

Students (7.5%) commented that the weaving of mats and hats were examples of traditional technology as illustrated by the students quote given below:

I think we do have traditional technology. I think it is the weaving of a hat (SI'Sc'M40).

Students (7.5%) mentioned that farming methods were examples of traditional technology as illustrated in the quote given below:

Yes. The traditional methods of farming by burning and planting using digging sticks (SI'HE'F10).

Other students (25%) identified examples of traditional technology such as preparation of herbal medicine, stone axe and digging sticks, preparation and cooking of food, bows and arrows, stone carving, making traditional musical instruments bird's traps and snares.

The next section will deal with reasons for learning traditional technology.

- **Reasons for learning traditional technology**

In table 8. 20 students commented on their reasons for learning traditional technology.

Table 8. 20: Students' reasons for learning traditional technology

Reasons for learning traditional technology	**Student** M	F	**Total** N = 40	**Percentage** (%)
Preserving Culture *(identity, heritage, part of lifestyle)*	20	7	27	67.5%
Beneficial *(economic reason, cheap, easy, important)*	6	7	13	32.5%
Total	**26**	**14**	**40**	**100%**

Students gave two main reasons for learning traditional technology and they were preserving their culture and traditional technology were beneficial. Students (67.5%) said loosing the traditional technology culture was a concern therefore they made an effort to preserve their culture. Identity and heritage is also important as illustrated in the quote given:

It is a way of preserving our culture because we will certainly need is knowledge and skills to survive the unknown future (SI'SC'M11).

Students (32.5%) stated that the reason for learning traditional technology was the benefits gained from it as illustrated in the quote given below :

I think it is better to learn traditional medicine because nowadays some diseases cannot be cured by modern medicines, but by using traditional medicines they have cured them. It is beneficial to us. (SI'SC'M4).

The next section will deal with the usefulness of traditional technology in the Solomon Islands society today.

- **Usefulness of traditional technology today**

In table 8. 21 students gave their views on the usefulness of traditional technology today.

Table 8. 21: Usefulness of traditional technology in Solomon Islands Society today

Usefulness of traditional technology today	Students M	Students F	Total N = 40	Percentage (%)
Yes	23	12	35	87.5%
No	3	2	5	12.5%
Total	**26**	**14**	**40**	**100%**

According to Table 8. 21, traditional technology is still useful in the Solomon Islands today. Students (87.5%) said it was still useful but it depends where one resides. In urban areas traditional technology may not be useful but when urban dwellers go back home to the rural settings, traditional technology becomes useful as illustrated by the quote given below:

Yes of course it is still very useful but I see it this way. Let me explain. For the rural poor they can not afford modern technology. They will still need traditional technology. As for the rich urban dwellers, traditional technology is not for them as they will discard it and go for the modern technology. So basically I think it depends on the economic status of individuals, families and communities (SI'Sc'M14).

Students (12.5%) said that they did not think it was still useful because there were better things and so there is no longer a need for traditional technology as illustrated in the quote given below:

No, I no longer see its' usefulness today because there are so many new and modern technologies we now have, that the need for traditional technology will be a thing of the past (SI'IA'M22).

This section has shown students' perceptions of traditional technology. The next section is a summary of the findings.

8.6 SUMMARY OF THE FINDINGS

The following is a summary of the findings of students' perceptions of technical education, technology and traditional technology in the Solomon Islands.

As part of this research, students' subject choices (subjects students took at high school) were surveyed and the results indicated that subject choices tended to be based on academic subjects. The technical subjects on the other hand, were streamed and gendered. The research also found that English had a 100% enrolment, and was the language used in school, while although Maths was important it only had a 60% level of enrolment.

The study found that the reasons for subject choices given by students varied and included the following issues: firstly, the subject was a requirement by the school (67.5%), secondly, it was interesting and enjoyable (12.5%), thirdly, it was for a future career (10%), and finally it provided background knowledge for further studies (10%). The study also highlighted students' future career choices which allowed for a wide range of courses including the most popular engineering and building (25%) to the least popular lawyers and politicians (5%). The issue regarding whether subject choices were preparing students for their future careers was raised. Seventy percent of students said they were preparing them for their future careers, while 17.5% said they did not. The remaining 12.5% of students said subject choice was preparing them only to an extent. Regarding usefulness of subject choice to their future careers 87.5% said they were useful as they were meeting students' needs while 2.5% said they were not useful. The remaining 10% said they were not sure.

On the issue of career choice influence, 67.5% of students said that they made their own decisions while 32.5% said either their parents or relatives influenced them. The study also focused on other things students would like to learn at school and in response, students listed computing particularly, the CAD package (25%), arts subjects such as sports, music, culture and drawing (25%), technology subjects which included industrial arts, technical drawing, motor mechanics etc (20%), business and accounting (10%) food technology such as home economics, cooking etc (7.5%) and the sciences subjects (2.5%).

The study also surveyed students' perceptions on the existing technical education curriculum. Students' perceived the existing technical education as useful but needing improvement while 5% stated it prepares citizens for future life.

The question on the level of interest in technical subjects was also raised with students. The study found that 47.5% of students said the level of interest in the existing technical subjects was low, while 30% said there was an interest. Fifteen percent of students said it was optional which meant that it was not compulsory and non-examinable while the remaining 7.5% said they were not sure. Further the issue of the relevance of the existing technical curriculum was raised. Ninety percent said the existing technical education curriculum was relevant while 10% said only parts of it were relevant.

The research also focused on students' perceptions of technology. Three answers were given as follows: First, 45% of students said they viewed technology as the application of techniques etc, Second, 35% said they viewed technology as recent phenomenon which has the added quality of being new, the latest, modern, amazing etc, Third, 17.5% said they viewed technology as artefacts such as machines, tools, gadgets and equipment. On the same topic, students were asked to gives examples of things they considered to be technology. Students' choices of examples varied widely. The students' list of examples included: transport (27.5%) including planes, boats etc, computers (17.5%) including high-tech things, shelter and dwellings (12.5%) such as houses, schools etc (12.5%), fishing methods and fishing gear (10%) such as spears and goggles, artefacts (5%) which included anything produced by humans such as art and workmanship and others such as farming tools, kitchen ware, medical equipment, stationary (books and pencils), communication facilities, general engineering, sports facilities and textile products.

Next, students gave their reasons for choosing these answers which included: improved efficiency (37.5%) fastness, speed and making work easy, recent phenomenon (30%) qualifying it with words such as new, modern, and the latest, man-made products (15%), fascinating (12.5%) because it was attractive, different and amazing and finally application (5%) as being practical. Another issue raised with students was their reasons for liking technological things. In their answers, students gave four main reasons as follows: improved efficiency (65%) which has the connotation of making life easier, faster, comfortable and efficient; they were useful, practical and beneficial (17.5%); they were recent phenomenon (15%) new, the latest, modern etc; they were aesthetically appealing (5%) and pleasing to the eye.

Continuing with perceptions of technology, students were asked what kind of technology they would like to learn at school. They listed seven areas as follows: computing (30%), electronics and electrical things (22.5%), industrial arts (15%), designing and project making (12.5%), architecture (7.5%), home economics (7.5%) and mechanics (5%). Further, the students were asked what kinds of technology they would be interested in doing at school of which they said things from computing (35%) to students' own choice (5%). In the study, students' perceptions of the phrase doing technology at school was also raised. In their replies students viewed doing technology as the application of practical activities (45.5%), the broadening and improvement of knowledge and skills (35%) and finally they viewed it as preparation for their futures (17.5%).

The study also surveyed students' perceptions of traditional technology. The question was raised as to whether students had knowledge of traditional technology. Ninety-five percent of students said they knew about traditional technology while 5% said they had no knowledge. Students were then asked to give some examples of traditional technology of which they listed the following: the making of canoes, fishing methods and techniques, traditional houses, preservation of food, weaving of mats and hats, farming methods, preparation of herbal medicine, stones axe and digging sticks, preparation and cooking of food, stone carvings, the making of traditional musical instruments and bird traps and snares. Students were then asked their reasons for learning traditional technology today. Two main reasons were given and they were listed as firstly preserving their culture (67.5%) and secondly being beneficial (32.5%). The final issue raised with students concerning traditional technology was whether traditional technology was still useful today. In their replies 87.5% of students said it was still useful today while 12.5% of students said it was not useful today.

This chapter has provided the findings concerning students' perceptions of technical education, technology and traditional technology in the Solomon Islands. The next chapter (chapter 9) will discuss the educators' perceptions of technical education, technology, technology education and traditional technology in the Solomon Islands.

CHAPTER 9

EDUCATORS' PERCEPTIONS OF TECHNICAL EDUCATION, TECHNOLOGY, TECHNOLOGY EDUCATION AND TRADITIONAL TECHNOLOGY IN THE SOLOMON ISLANDS

Raw data taken from questionnaires, interviews schedules, checklists, etc. need to be recorded, analysed and interpreted. Judith Bell, (1997).

9.1 INTRODUCTION

The previous chapter discussed students' perceptions of technical education, technology and traditional technology in the Solomon Islands. This chapter will focus on educator's perceptions of technical education, technology, technology education and traditional technology. There were 20 interview samples of educators used in this chapter of which 12 were males and 8 were females. The 20 educators consisted of high school teachers (8), tertiary teachers (4), principals (4) and curriculum developers (4). These educators were from various subjects. The reasons for interviewing educators included: firstly, educators were the writers of the curriculum; secondly, educators were the implementers of the curriculum; thirdly, educators had years of experience from which they could comment on the education system and lastly, educators were an important source for curriculum development and change.

This chapter is divided into six sections. The remainder of this chapter reports on:

9.2 Perceptions of Existing Technical Education Curriculum.

9.3 Perceptions of Technology.

9.4 Perceptions of Technology Education.

9.5 Perceptions of Traditional Technology.

9.6 Summary of Findings.

9.2 PERCEPTIONS OF THE EXISTING TECHNICAL EDUCATION CURRICULUM

This section covers perceptions on the existing technical education curriculum, the perceived purpose of technical education, a comparison of the existing technical curriculum with other curriculum, the relevance of the technical education curriculum, the level of interest in the existing technical education curriculum, perceptions of how further knowledge in other subjects will help in the teaching of technical subjects, weaknesses of the existing technical education curriculum and suggestions to improve the quality of the technical education curriculum.

- **Perceptions of the existing technical education curriculum**

In Table 9.1 educators commented on their perceptions of the existing technical education curriculum.

Table 9. 1: Educators' perceptions of the 'existing' technical education curriculum.

Perceptions of the existing technical education curriculum	Educators M	F	Total N = 20	Percentage (%)
Needs Revision & Improvement *(not relevant, out dated curriculum, no link with SICHE)*	6	3	9	45%
Struggling *(over looked, lack basic elements, lacks equipment, not emphasized)*	4	4	8	40%
Constantly revised *(getting better, support program)*	1	1	2	10%
Just Another Subjects *(just to fulfil requirement)*	1	0	1	5%
Total	**12**	**8**	**20**	**100%**

The educators' perceptions of the existing technical curriculum were divided into four categories. Three of the four categories agreed that the existing technical education curriculum was not appropriate and suggested that it needed some revisions and improvements as illustrated in the quotes given below:

> *We are trying and struggling to develop the subject as the subject was introduced in the early 70's. I think it can be developed further (SI'Ag'M2)*

> *At the moment I think it needs revision and it needs to be focus on what is best for the Solomon Islands. The existing technical curriculum does not really address the needs of the country now and in the future (SI'CS'M7).*

> *With regard to the existing technical curriculum, I think the school is trying to introduce ideas in technology, but it won't be up to standard, when the content is out dated and facilities are not good. I think the whole curriculum needs to be revised and brought up to the level required, and that is acceptable by overseas colleges and universities (SI'HE'F9)*

An important point raised by educators as seen in the previous quote, was that the standard of the existing technical education curriculum needs to be brought up to an acceptable level, comparable to overseas tertiary institutions. Educators (40%) commented that the technical curriculum was struggling due to the lack of funding, linkage and emphasis as illustrated in the quotes given below:

> *Basically, it is made up of traditional subjects such as industrial arts, metalwork, technical drawing and home economics, most of which are from the old curriculum. My personal view is that it is struggling to meet the demands of the country (SI'CS'M6)*

> *My view on the current technical curriculum is that it is struggling. This is due to the fact that not all schools have the materials and the equipment, to fulfil the requirements of the present curriculum (SI'IA'F14).*

The first quote above suggested that the technical education curriculum is struggling to meet the demands of the country. The above quotes show that the existing technical curriculum is not producing adequate graduates or the existing technical curriculum is not appropriate to meet the needs of the country. Other educators (10%) perceived the existing curriculum as constantly being reviewed as illustrated by the quote given below:

> *I've got some comments to make on both the technical curriculum in secondary schools which is part of the curriculum unit and technical education outside the set up of the curriculum. I've just been here for a short time but when I came in, I viewed the technical curriculum as Home Economics, Industrial Arts, Agriculture including Business studies. These areas have been moving from where they were so they are constantly developing. All of the principal curriculum officers have been revising their syllabuses. They have been revising their materials so we can say there has been revision put into these subjects for a better curriculum. Now the aim for all these principal curriculum officers is to move into areas known as modern technology so the Solomon Islands is not left behind. They also think that they should move along with the times to cater for what may come. So there has been work done by the principal curriculum officers and their subject panels in revising, reviewing and updating information on the technical curriculum (SI'IA'M20).*

The educator in the above quote, defined technical education as including home economics, industrial arts, agriculture and business studies. These subjects were the technical subjects currently being offered in the secondary schools in the Solomon

Islands. Only one educator (5%) said that the technical curriculum was just another subject. The educators' view of what the students thought of the importance of the technical education curriculum in general, is illustrated below:

> *My perception of the technical curriculum in the country is that students see this area as just another subject. Not a subject that they can look at as something which will lead them to their career in the future. They only see it as a another school subject . They will say "It is a requirement in this school that I take an elective subject but I will choose which one is the best option for me. If I cannot do agriculture or business studies then I will take Industrial Arts". That is the way I view the technical curriculum in the Solomons at the moment. I wish the students would see it as how it will benefit them in the future as a career rather then taking a care free attitude (SISSoc'M13).*

The above quote also raised the concern that students should be taught not to view the technical education curriculum as just another subject, but to value technical education as being useful subject. The next section will discuss the educators' perceived purpose of the technical education curriculum.

- **Perceived purpose of technical education**

Educators were asked what their perceptions of the purpose of the existing technical education curriculum were. Table 9. 2 illustrated their perceptions on this issue.

Table 9. 2: Educators' perception on the purpose of technical education.

Perceived purpose of technical education	Educators		Total	Percentage
	M	F	N = 20	(%)
Basic Education *(passing of knowledge & skills)*	6	2	8	40%
Practical Application & Manual Activities	1	5	6	30%
Knowledge Empowerment *(education in technical subjects, new concepts)*	1	1	2	10%
Tradesmen & Artesians	2	0	2	10%
Classroom Subject *(theory put into practice)*	1	0	1	5%
Preparation for Work *(training for workforce)*	1	0	1	5%
Total	**12**	**8**	**20**	**100%**

Educators' views on the purpose of the existing technical education curriculum varied as shown in Table 9.2. These answers indicated how educators value the importance of the purpose of technical education. Forty percent of the educators perceived the purpose of technical education as providing basic education as illustrated by the quotes given below:

> *It is the teaching of technical areas like they do in subjects such as industrial arts for example, the teaching of metals and wood (SI'Sc'F10).*

> *When I think of the words technical education, I think of educating children in the classroom with practical instructions. This knowledge is taught to students through theory and again taught through practical activities (SI'Sc'M11).*

The above quote also suggested that the purpose of technology is to provide education to students in the classroom. Educators (30%) further perceived the purpose of technical education as being the practical application of theories and the conducting of manual activities. However, educators stated that the choice of which technologies to use is up to Solomon Islands society as illustrated by the two quotes given below:

> *It is the application of technology in our society. The choice of which technology to use in our society is our own. Technical education in the classroom should be useful when applied to real life situations (SI'Ssoc'M13).*

> *I will try and give meaning to this term although it has been used so often in the school system. My view of the word 'technical education' is the type of education students gain from doing practical activities such as making projects and using their hands. I hope I am right in saying this (SI'HE'F19).*

Educators (10%) also viewed the purpose of technical education as knowledge empowerment, which means knowledge gained in both theory and practical activities in technical subjects, which is purposeful and useful. The term 'knowledge empowerment' also means the ability of achieving progress through the means of having acquired technical theoretical knowledge, practical skills and methods as illustrated by the quote given below:

> *It is education in technical subjects such as agriculture, where students are trained in both the theory and practical aspects of topics like animal husbandry or the farming of vegetables using hydroponics methods (SI'Ag'M5).*

Educators (10%) also said that they see the purpose of technical education as turning people into tradesmen and artesians because technical education is practicality oriented as illustrated in the quote given below:

> *For me when I hear the word technical education I think of electricians, plumbers but not agriculture. I've only thought agriculture as technical education through our discussion (SI'IA'M18).*

Educators (5%) stated that they also viewed the purpose of technical education as being a classroom subject because subjects such as industrial arts, home economics and computing were official classroom subjects. Educators suggested the word 'technical' meant application of theory and, usage of hands, whereas 'education' meant knowledge acquired at school. A combination of these two together creates a knowledge of technology as illustrated in the quote given below:

> *The word had two parts 'technical' and 'education.' I think technical is concerned with the application of knowledge using our hands while 'education' is the knowledge acquired from school. Technical education is therefore the knowledge of technology acquired by the making of a project (SI'CS'M7).*

Educators (5%) also said that another purpose of technical education was as a preparation for work, because it trains students for their future careers as shown in the quote given below:

> *Technical education means preparing people for the work force. Training people with technical knowledge to fit into the workforce such as in industry and factories (SI'Eng'M12).*

The next section is a comparison of the existing technical education curriculum with other curriculum.

- **Comparison of the existing technical education curriculum with other curriculum**

In Table 9.3 educators made a comparison between the existing technical education curriculum and other curriculum.

Table 9. 3: Comparison of the technical education curriculum with other curriculum.

Comparison of the 'existing' technical education curriculum with other curriculum	**Educators**		**Total**	**Percentage**
	M	**F**	**N = 20**	**(%)**
Needs Revision & Improvement *(out-of-date curriculum)*	7	2	9	45%
Lacks Emphasis & Support *(optional subjects, lack linkage)*	4	2	6	30%
Comparable & Making Progress *(practical oriented)*	1	3	4	20%
Need Qualified Teachers *(lacks confidence in contents)*	0	1	1	5%
Total	**12**	**8**	**20**	**100%**

When comparing the technical curriculum with other curriculum, educators found that the technical curriculum was lacking in three areas as listed in Table 9.3. According to educators (45%), the technical curriculum needs revision and needs improvement, because it's contents were out dated and were not well designed so it is irrelevant as illustrated in the quotes given below:

> *I think it needs change because some parts of it are no longer relevant. Technology has changed so much over the last few years that what we teach our students in high school is now out of date, not all but some aspects of it (SI'IA'M4).*

> *I think it needs improvements because I think there has not been a thorough review carried out in the high school curriculum and the tertiary institutions. I think in that area there is a need to have some input from course advisory committees or a forum for people from various sectors of the community to contribute. I think this is why the technical curriculum is not progressing as well as other curriculum (SI'IA'M20).*

Educators (30%) also said that the technical curriculum lacks emphasis and lacks support from those in authority. There is an urgent need to improve the technical curriculum as students need to be kept up to date with the latest technology. At the same time technical education needs to be taken seriously by both students and teachers. Two typical quotes highlighting a lack of commitment from the administration are given below:

> *I think less emphasis is put on the technical curriculum compared with the academic curriculum. I personally feel with the advancement in technological knowledge our students should be given the opportunity to be part of this new knowledge (SI'Sc'F10).*

> *The feeling is that the academic administrators do not support the technical curriculum because they view it as not being important. The trend is for more as an academic emphasis rather than a technical emphasis. There is a need to take the technical curriculum more seriously (SI'Eng'M12).*

Educators (20%) also said that technical education is comparable to other school curriculum and has been making steady progress in development over the past few years. Educators also raised a few concerns such as (a) allocation of timetable scheduling as technical education has less time, (b) technical education was used for less academic students and (c) bridging the education gap between the lower level and the upper levels in high school as illustrated by the quotes given below:

> *I think the technical curriculum in many respects is comparable to the other curriculum in high school. I think the problem lies in the administration and implementation of the curriculum. There needs to be consistency in the allocation of timetable periods. There is also the need to check that the technical curriculum is not used as a dumping ground for students who can not continue into higher levels of high school. There is a need to bridge the gap between lower level and higher forms (SI'Eng'M12).*

> *I cannot say it is developed or underdeveloped but personally I think it is making progress. Over the years it has made steady progress and in keeping with that trend the curriculum should be quite relevant (SI'IA'F14).*

Educators (5%) also said that there is a need for qualified teachers who are confident in teaching technical subjects, because they are competent in their subjects. Educators also raised the issue concerning unqualified teachers currently teaching technical subjects as illustrated in the quote given below:

> *I would say that the teachers in the high schools are not confident in teaching certain areas of the technical curriculum and often give wrong information to students. There is a need to get more qualified teachers to teach these subjects (SI'SS'F8).*

The quotes highlighted the problem that the existing technical education curriculum is facing, in that it is not comparable with other curriculums as it is of a lower standard. The next section will discuss the relevance of the existing technical education curriculum.

- **Relevance of the existing technical education curriculum**

Table 9.4 indicates educators' perceptions of the relevance of the technical education curriculum.

Table 9. 4: Educators' perceptions of the relevance of technical education.

Relevance of the 'existing' technical education curriculum	Educators M	F	Total N = 20	Percentage (%)
Yes, Relevant & Appropriate	6	6	12	60%
Only Some Parts Are Relevant *(to an extent meaning some part are relevant while other parts are not)*	6	2	8	40%
Total	**12**	**8**	**20**	**100%**

Sixty percent of educators said technical education was relevant while 40% said only some parts were relevant. A typical quote to illustrate the relevancy of the existing technical curriculum is given below:

> *Personally I think it is very relevant to the country because most knowledge and skills learnt can be useful in the development of the country and where unemployment is a problem can create employment or services to the country (SI'HE'F19).*

According to the previous quote, the existing technical education curriculum is adequate as it has enable many students to gain employment. Educators (40%) also said that some parts of the technical education curriculum were relevant, but not all of it. A typical quote illustrating this idea is given below:

> *To an extent it is relevant but given the current technological development in the country, I think there is a lot more to do. The Solomon Islands need to train more technical people in technical areas (SI'IA'M18).*

It was also suggested by educators' responses that the standard of the existing technical education curriculum needs to be uniform at all levels. The next section will discuss the level of interest in the existing technical education curriculum.

- **Level of interest in the existing technical education curriculum**

Table 9.5 shows educators' perceptions on the levels of interest in the existing technical education curriculum.

Table 9. 5: Educators' views on students' level of interest in the existing technical education technical education curriculum.

Level of interest in the existing technical education curriculum	Educators M	F	Total N = 20	Percentage (%)
No, Not Interested In	9	6	15	75%
Yes Interested In	3	2	5	25%
Total	**12**	**8**	**20**	**100%**

Educators (75%) said that there was a lack of interest in the technical curriculum due to many of the following reasons such as: parental influence, future jobs were limited and how the subject was taught. The negative responses from educators could also be as a result of disappointment over graduates not being able to secure a stable job. A quote to illustrate the lack of interest in the technical curriculum in high schools is given below:

> *In my experience working with students and training them, it does not seem to be popular and I think one reason is because of the parents' aspirations for their children, to have better paying jobs. I also think the way the subjects are being taught and how the course is being delivered. It's not exciting for the young people. They see it more as work than learning and maybe you will also notice that there is a trend for young people to try to get away from work oriented subjects. You'll find young people in the high schools has negative attitudes towards work especially technical work, working with their hands has not been the same as students in the past and you'll always hear the old students lamenting about how hard it used to be whereas now it is not (SI'HE'F19).*

The lack of interest in the existing technical education curriculum could also be based on (a) students negative attitudes towards technical education, (b) students' views technical education as work rather than learning and, (c) the changing lifestyles of the Solomon Islands towards a more comfortable western lifestyle. Twenty-five percent of educators however, said the technical education curriculum has a high level of interest for students in high schools. A typical quote to illustrate this is given below:

> *In our school here for example, Home Economics is very popular with the girls. I think the parents, mostly mothers, are happy that their daughters are taking Home Economics and I think girls themselves are happy. It is part of a trend so that it can help them in their future life. I cannot say that for Industrial Arts. It also depend on the teachers too. I find that some of my male students are not very keen maybe they have been put off. Even if they have an interest in it or not they could have a go at it. The teacher should even be encouraging and not say negative things and criticize them. I would say that if there is a good teacher who encourages the students, I think a lot of the boys would be very interested in the course because the course is compulsory for boys therefore they just have to take it but if they are given an option I think a lot of boys will get out of Industrial Arts. Not because of the subject itself but because of the approach of the teacher. (SI'HE'F17).*

The next section discusses educators' perceptions of how further knowledge in other subjects would help in the teaching of technical subjects.

- **Perceptions of how further knowledge in other subjects would help in the teaching of technical subjects**

Table 9.6 indicates educator's perceptions on how some background in other subjects would help in the teaching of technology subjects.

Table 9. 6: Perceptions of how background knowledge in other subjects would help in the teaching of technology subjects

Perceptions of how further knowledge in other subjects would help in teaching technical subjects.	Educators M	Educators F	Total N = 20	Percentage (%)
Computing *(CADD LT & other drawing packages)*	2	3	5	25%
Repair & Maintenance *(engines, agricultural machines, kitchen, domestic)*	2	2	4	20%
Teaching Methods *(skills, techniques)*	1	1	2	10%
Electrical Skills & Electronics	2	0	2	10%
Accounting	2	0	2	10%
Management *(marketing)*	1	1	2	10%
Wood Chemistry	1	0	1	5%
Allied Plastics *(fibre-glass)*	1	0	1	5%
Educational Tour	0	1	1	5%
Total	**12**	**8**	**20**	**100%**

Educators list the above areas as other subjects they would like to learn to help them teach technical subjects confidently. The areas range from the popular computing to the choice of educational tours. A typical quote from educators (25%) supporting computing is given below:

> *If I were to choose which area I would like to learn it would be computing because computers have became part of our lifestyle today. It is here to stay therefore I had better join the bandwagon (SI'Eng'M12).*

Educators (20%) said a knowledge of technical repair and maintenance would be a great benefit. This shows that educators were aware of the importance of maintaining these technological gadgets as illustrated in the quote given below.

> *Some training in practical work which I have had no access to before for example, repairing agricultural machines because by understanding and knowing these contents I can teach these areas confidently. I should not depend on others on these areas because with or without assistance I could still teach them (SI'Ag'M2).*

Educators (10%) also said that the teaching methods are important. Teachers were concerned that their teaching methods were not clear to students in the areas they specialised in and they would like to improve on this. This could suggest that educators were aware of the difficulty in trying to teach theory in a practically-oriented type lesson. The quote given below explains educators' concerns well:

> *I think the skills needed right now are in teaching methods regarding the presentation of specialised technical areas. Why I am saying this is because I think we have done our best. We are trying our best but somehow students are not responding and this is a concern. They don't seem to understand the concepts of that we teach them, therefore I am calling for better methods of presentation (SI'CA'M1).*

Educators (10%) said they would like to have a good knowledge and understanding of electrical skills and electronics areas to be able to teach it. The quote given below explains the reasons for wanting to learn electrical skills and electronics:

> *Although it is not part of the technical curriculum as yet I would like to learn more about electronics and electrical knowledge. In some of our student project work they include electrical aspects and I often send my students to science teachers (SI'IA'M18).*

Educators (10%) said accounting is vital to any technical teacher because this knowledge could help teachers in reducing the costs of running a technical education programme as illustrated by the following quote:

> *Being an agriculture teacher I would like to learn more about accounting. This I think will help me keep my books correctly (SI'Ag'M5).*

Ten percent of educators would like to learn management as an area to improve the quality of teaching technical education subjects as illustrated by the quote below:

> *Perhaps a knowledge of management will help me in my teaching. How to plan out and organise myself (SI'Ssoc'M13).*

Educators' perceptions strongly suggested that further learning in other subject areas would help improve the teaching of their technology subject. The next section will discuss the weaknesses of the existing technical education curriculum as perceived by educators in the Solomon Islands.

- **Weakness of the existing technical education curriculum**

Table 9.7 shows educators' perceptions of the major weaknesses in the existing technical education curriculum.

Table 9. 7: Major weaknesses of the existing technical education curriculum.

Weakness of the existing technical education curriculum	Educators		Total	Percentage
	M	F	N = 20	(%)
Lack of Resources *(expertise, facilities, machinery, tools)*	5	3	8	40%
Lack Support *(direction, coordination, commitment, emphasis)*	2	3	5	25%
Obsolete Curriculum *(aspects 70's & 80's curriculum still exist, irrelevant curriculum)*	3	1	4	20%
Lack Level of Education Link & Balance *(too much theory, no link with higher level)*	2	1	3	15%
Total	**12**	**8**	**20**	**100%**

Educators identified four major areas of weakness in the existing technical education curriculum as follows: lacking resources, lacking linkage and balance, lacking support and having an obsolete curriculum. Educators suggested that these weaknesses, hindered the progress of technical education curriculum development in the Solomon Islands. Others commented that they saw no major weaknesses in the existing technical education curriculum, but admitted that there is a need for some revision and improvements. Other educators (40%) indicated that there was a real problem regarding the lack of resources as illustrated by this quote:

> *The main weakness of the curriculum as I see it is concerning resource materials and tools. The content is alright but I'm concerned with what is available to support the content. A lot of schools in the country found problems with materials and tools. We are now trying to move away from traditional system where teachers spoon feed the students. We are trying to get the students to think more independently for themselves (SI'IA'M4).*

Educators further highlighted that having a good curriculum without resource material and tools was a real concern. Educators (25%) also commented that there was a lack of support for the technical programme. School administrators put more emphasis on academic subjects so the development of technical education is falling behind as illustrated by the quote given below:

> *The weak points of the technical education curriculum are as follows: administrators do not support the programmes because they do not see the importance of these subjects even though they are part of our school system; training of teachers does not match the development of the technical programme in the school system and; teachers can't cope with technical subjects unless they are trained (SI'IA'F9).*

According to educators (20%) the technical curriculum is out dated and needs revision. Some parts of the curriculum have been revised but other sections still need to be revised. Educators were also concerned when comparing the rate of development of the technical education curriculum within the country and internationally as illustrated by the quote given below:

> *I think aspects of the curriculum are out dated and there is a need to revise the curriculum and to re-look at the objectives and aims of technical education in light of what is needed in the country (SI'IA'M20).*

Educators (15%) were also concerned that there was no linkage between the lower levels and the upper levels at high school in the existing technical education curriculum. Educators' concerns were based on continuity and flow of knowledge from one level to the next level in high schools as illustrated by the quote given below:

> *This is just my personal view. First there should be adequate material resources if we really want to get into this area. Make it available in all the schools. Secondly there should be a link between the lower forms and the upper forms (Forms1-7). A spiral type curriculum. When the students are in Forms 1-3 they do everything (business studies, agriculture, Home Economics for girls and Industrial Arts for boys). However, when they go on to the senior levels they can not continue because it is not offered. I hope in the future this gap is filled (SI'HE'F16).*

Educators also highlighted the main weaknesses which they said hindered the progress of the existing technical education curriculum. The next section deals with suggestions to improve the quality of the existing technical curriculum.

- **Suggestions to improve the quality of the technical education curriculum**

In Table 9.8 educators made some suggestions to the improve the quality of the technical education curriculum.

Table 9. 8: Suggestions for improvements of technical education by educators.

Suggestions to improve the quality of the technical education curriculum	Educators M	F	Total N = 20	Percentage (%)
Review Curriculum *(introduce new ideas)*	5	2	7	35%
More Resources *(better trained teachers, more funding, better facilities etc)*	4	3	7	35%
More Emphasis *(make it attractive, create job market)*	3	2	5	25%
Equal Timetable *(equal number of periods per week)*	0	1	1	5%
Total	**12**	**8**	**20**	**100%**

Provided is a list of suggestions made by educators to improve the quality of technical education in the Solomon Islands. Educators believed that these four areas are critical for the improvement of the existing technical education curriculum. Educators (35%) suggested that revision of the curriculum is needed. The four points also implied that the existing curriculum is out of date as illustrated in the quote given below:

> *As I said previously there is a need for a revision of the technical curriculum. Traditional technologies should form the base knowledge and building on that should be the latest in technology. I suggest a review committee be set up to review the whole technical education curriculum (SI'IA'M20).*

Educators also suggested in the above quote that existing traditional indigenous technologies should form the base for the introduction of the technology subject in the classroom. They suggested the formation of an education review committee to look into all these issues. Educators (35%) also said more resources were required in terms of expertise (teachers, inspectors), materials, machinery, textbooks, tools available to schools and students . This is illustrated in the quote given below:

> *To improve technical subject in secondary schools we need to have the expertise of trained teachers in technical subjects. We also need better facilities because teaching without good facilities will be difficult. Trained teachers and facilities are important resources (SI'CA'M1).*

Educators (25%) also suggested that there needs to be more emphasis on technical education, as there has been a lack of emphasis on the technical curriculum over the past few years and a re-focus was suggested. Again educators re-emphasized the issue of better coordination as illustrated by the quote given below:

> *I would like to suggest that there be more emphasis on the technical curriculum from the ministry. The ministry supports it with funding and provides necessary facilities when schools requires them. However, the technical curriculum needs to work closely with the technical arm of the ministry and coordinate it with resources (SI'HE'F19).*

Educators (5%) also said there needs to be an equal timetable for all subjects as there has been inequality in time periods allocated for each subject, as the present system allocated more hours to academic subjects. Such allocation could be interpreted as being unfair and discriminatory as illustrated by this quote below:

> *I would like to suggest that the technical subjects be given an equal number of periods per week. At the present moment technical subjects have less periods of time tabled compared with academic subjects (SI'IA'F14).*

Educators' perceptions revealed many suggestions to improve the quality of the existing technical education curriculum. The next section will discuss educators' perceptions of technology.

9.3 PERCEPTIONS OF TECHNOLOGY

This section covers perceptions of technology and the kinds of technology younger children would be interested in doing at school.

- **Educators' perceptions of technology**

Table 9.9 shows educators' perceptions of technology.

Table 9. 9: Solomon Islands educators' perceptions of technology.

Educators' perceptions of technology	**Educators M**	**F**	**Total N = 20**	**Percentage (%)**
Application & Problem -Solving *(past, present, future, connection or related to human)*	4	3	7	35%
Knowledge & Skills *(technology content, classroom learning, imput, gathering ideas)*	3	2	5	25%%
Process *(development)*	2	2	4	20%
Artefacts, *(machines, hardware, systems)*	2	1	3	15%
Improved Efficiency *(faster, quicker, power generated source)*	1	0	1	5%
Total	**12**	**8**	**20**	**100%**

Educators' perceptions of technology varied as illustrated in Table 9.9 above. The views range from application and problem-solving to improved efficiency. Educators (35%) viewed technology as application and problem-solving as illustrated by the quote given below:

> *Technology is the techniques and skills in the application of knowledge. An example in agricultural science is in the practical portion of it (SI'Ag'M5).*

Educators in the above quote highlighted technology as techniques and skills in the application of knowledge. Educators (25%) perceived technology as the accumulated input of knowledge and skills acquired during our lifetime to make our lifestyles better. A typical quote illustrating the notion of technology being as input of knowledge and skills is given below:

> *Technology is an input of new ideas and concepts which can be used to implement things (SI'Eng'M12).*

Educators (20%) again viewed technology as a process that goes through stages to reach a conclusion, such as the making of an object, the building of a house out of timber or the casting of a shape out of metal. A typical quote explaining the notion of process is illustrated below when making a fibre-glass boat:

> *It is the process of producing new things through stages for example, designing and making boats out of fibre-glass (SI'Sc'F10).*

Educators (15%) perceived technology as artefacts which in this context means machines etc. The making of things out of machines could refer to the lathe machine to shape a table leg or using the arc welding machine to frame a structure as illustrated in the quote given below:

> *I think technology deals with machines. The use of machines in doing things (SI'IA'M18).*

Educators (5%) saw technology as providing improved efficiency, because of technology our work is more efficient and takes less time to do. Educators interpret improved efficiency as making life easier as illustrated by the quote given below:

> *Technology means something that we use to make our work more effective and make our life much easier (SI'IA'M17).*

It was evident from the above quotes that educators' perceptions of technology varied. The next section discusses the kinds of technology students would like to learn at school.

- **Kinds of technology students would be interested in doing at school**

In Table 9.10 educators identified the kinds of technology students would be interested in doing at school.

Table 9. 10: The kinds of technology students would be interested in doing at school.

Kinds of technology students would be interested in doing at school	**Educators**		**Total**	**Percentage**
	M	**F**	**N = 20**	**(%)**
Computing	2	3	5	25%
Basic Technology *(being innovative and creative, problem-solving, dyeing, building blocks, fixing, motor mechanic)*	4	1	5	25%
Electronics	1	3	4	20%
Learning About Other materials *(plastics, fibre-glass)*	2	0	2	10%
Food Technology *(preservation techniques)*	1	1	2	10%
Alternative Agriculture *(hydroponics)*	2	0	2	10%
Total	**12**	**8**	**20**	**100%**

The educators' list of the kind of technology students would be interested in doing at school consisted of six groups. Computing was the most popular one because it is the latest technological gadget and educators (25%) know that students are very inquisitive as illustrated in the quotes given below:

> *I think computing will be interesting for students at school. Children are very inquisitive therefore computing would be very interesting to them. (SI'CS'M6).*
>
> *Kids of today would be very interested in learning about computing because it is the latest technology. The computer now comes with many new CDs for learning and games especially designed for children (SI'CS'F15)*

Educators (25%) said students like to learn about many technologies at school. These were placed under the heading basic technology which includes being innovative and creative, problem-solving, fixing, building blocks, etc. A typical quote to illustrate an interest in such a wide range of technologies is given below:

> *I think an innovative and creative technology approach like making things out of puzzles, building things out of blocks and allowing them to be just themselves will be interesting to them (SI'CA'M1).*

Educators also highlighted the fact that allowing students to be themselves is much more interesting to them than studying an imposed subject. Educators (20%) suggested that electronics technology would be interesting to students at school. A real life situation in the Solomon Islands where enrolment in electronics has increased is illustrated in the quote given below:

> *My Form 5 class this year has increased to 25 and the majority indicated that they want to work on electronics (SI'Sc'F10).*

Educators (10%) also suggested that students would be interested in learning new things. Although sometimes they may be hesitant to venture into new areas as illustrated in the quote given below:

> *Concerning my subject students could be interested in modern cooking equipment and sewing machines. They sometimes are afraid of these electric machines and are hesitant to use them (SI'SS'F8).*

Educators (10%) also suggested that students would be interested in food technology using old and new methods as illustrated in the quote given below:

> *I think they would be interested in the old and new cooking methods. They would also be interested in learning new recipes and about food from other countries (SI'HE'F3).*

Educators (10%) also thought that students would be interested in learning alternative agriculture such as hydroponics at school coupled with the more basic traditional techniques which are more sustainable to the environment as illustrated in the quote given below:

> *In my field of agriculture, perhaps they could be introduced to basic farming methods to help them grow their own food. Later on they can be introduced to hydroponics farming (SI'Ag'M2).*

The next section will discuss educators' perceptions of technology education.

9.4 PERCEPTIONS OF TECHNOLOGY EDUCATION

In this section, educators were asked to give their perceptions on technology education.

- **Educators' perceptions of technology education**

In Table 9.11 educators commented on their perceptions of technology education

Table 9. 11: Educators' perceptions of technology education.

Educators' perceptions of technology education	**Educators M**	**F**	**Total N = 20**	**Percentage (%)**
Education of Technology *(the study of technology)*	5	1	6	30%
Teaching & Learning *(educating)*	3	2	5	25%
Methods & Techniques *(mechanisms)*	2	1	3	15%
Artefacts & Usage of Artefacts *(appliances)*	1	2	3	15%
Classroom Subjects	1	1	2	10%
Knowledge & Skills	0	1	1	5%
Total	**12**	**8**	**20**	**100%**

Table 9.11 shows that educators' perceptions of technology varied which may be due to their educational backgrounds and possibly their cultural up-bringing. Thirty percent of educators viewed technology as the education of technology which includes subjects such as industrial arts, drafting or motor mechanics as illustrated in the quote given below:

> *Technology education is the education of all types of technology learnt at school. For example, in industrial arts the knowledge of the different areas and different machines used in the workshop are part of the education of technology (SI'IA'M4).*

The above quote also highlighted the notion of having knowledge in different technical areas and the usage of the various machines used in the workshop. Twenty-five percent of educators viewed technology education as teaching and learning where students were being taught about technology and its usage as illustrated in the quote given below:

> *Technology education means educating the young people in the use of new technology. Education in the use of computers to me is technology education (SI'SS'F8).*

Fifteen percent of educators viewed technology education as being the methods and techniques in any field of study. This could include the old and the new methods and techniques of which both have advantages and disadvantages. Agricultural methods and techniques used to increase food production is a good example of this as illustrated in the quote given below:

> *I think that in agriculture, it is the modern methods of growing food to increase production. In traditional society our ancestors used simple methods, but nowadays fertilizers and scientific methods increase the production of produce (SI'Ag'M5).*

Another 15% of educators viewed technology education as artefacts and the use of artefacts. The introduction and use of appliances and machines to enhance work done by humans. The aspect of health consciousness is also an important issue in modern artefact usage as illustrated by the quote given below:

> *For me, technology education in home economics would mean the use of western appliances to improve cooking. How can we improve our cooking systems so that we don't have a lot of smoke in the kitchen because we know smoke is not good for our health (SI'HE'F16).*

Ten percent of educators viewied technology education as a classroom subject where the theoretical knowledge and skills were taught to students. This theoretical knowledge and skills were used in conjunction with the usage of workshop machines as illustrated by the quote given below:

> *It is teaching about technology. It is the education of technology. In a technical classroom learning the use of the machines is an important part of training (SI'IA'M20).*

Five percent of educators viewed technology education as knowledge and skills which were acquired at school. This knowledge and skills learnt from school would be in technical subjects such as industrial arts, home economics and agriculture as indicated in the quote given below:

> *I think it is the knowledge and the skills in technology learnt in the classroom (SI'HE'F9).*

The quotes presented above indicated that educators in the Solomon Islands have varying views of technology education. The next section covers educators' perceptions of traditional technology.

9.5 PERCEPTIONS OF TRADITIONAL TECHNOLOGY

This section will cover educators' perceptions of traditional technology and the usefulness of traditional technology.

- **Educators' perception of traditional technology**

Table 9.12 identified educators' perceptions of traditional technology.

Table 9. 12: Educators' perceptions of traditional technology.

Educators' perceptions of traditional technology	Educators M	F	Total N = 20	Percentage (%)
Methods & Applications *(knowledge & skills, unique ways of doing things)*	5	3	8	40%
Cultural Heritage *(that which was developed by ancestors and passed down)*	3	3	6	30%
Living Technology *(that which is still relevant & being practiced today)*	3	1	4	20%
Artefacts *(a product of human art and workmanship)*	1	1	2	10%
Total	**12**	**8**	**20**	**100%**

Forty percent of educators from the Solomon Islands viewed traditional technology as methods and applications. The responses from educators show that Solomon Islanders value their traditional technologies and viewed them as useful even in a modern context.

They used traditional methods of cooking as an example of traditional technology as seen in the quote given below:

> *I think of traditional way of cooking food used by our village folks. Three methods were used in the olden days. Food could be cooked over the open fire, food could be cooked in bamboo and food is cooked in an earthen oven. These methods provided different flavours and tastes to the food (SI'HE'F3).*

Thirty percent of educators viewed traditional technology as cultural heritage. They were skills developed by ancestors and passed down to become part of the culture and lifestyle of the Solomon Islands today. However, there was a concern raised by educators that many young Solomon Islanders are not interested in acquiring these traditional technologies. Many of the older generation are passing away without passing on this knowledge and skills to the younger generation. According to the quote given below this issue needs to be addressed.

> *As far as I can see in the Solomons this traditional technology is inherited and at the moment it is still very much encouraged by the elders that the young ones should maintain the traditional knowledge and skills. In my own community not very many young people know how to make a dug-out canoe and that technology is only known by the elders in the village. These elders are slowly dying carrying these skills with them and perhaps in the future all these will be replaced by these ray fiber glass boats. We've got lots and lots of trees in the jungle so we should not spend a lot on these expensive materials instead we should use these trees to make ourselves dug-out canoes (SI'IA'M20).*

Another aspect of these traditional technologies as highlighted by the quote above is that they are less expensive than the modern western technologies and better suited to the local environment. Educators (20%) also perceived traditional technology as living technology because it is still being practiced today. The fact that these traditional technologies were inherited as part of the daily living of Solomon Islanders confirmed this concept. A quote illustrating living technology is given below:

> *Traditional technology is inherited and is a normal daily way of life in the village. It is practical technology and is a living technology. Every aspect of living in the village has to do with technological activities. For example in fishing, specific knowledge and skills are required. This would be the same with farming, cooking and the making of arts and crafts (SI'IA'M14).*

Educators (10%) also viewed traditional technology as artefacts. There are many traditional artefacts like spears, mats and digging stick. One of the characteristics of traditional technology is highlighted in the quote given below:

> *Traditional technology in agriculture. I am thinking of the digging sticks to make holes when planting the sweat potato or for digging up matured yams (SI'Ag'M2).*

The perception of traditional technology as indicated in the quotes given above shows that educators were very much aware of the existence and significance of traditional technologies in the Solomon Islands. The next section will discuss the usefulness of traditional technology in the Solomon Islands today.

- **Usefulness of traditional technology today**

Table 9.13 shows educators' perceptions on usefulness of traditional technology today.

Table 9. 13: Educators' perceptions on usefulness of traditional technology in modern Solomon Island today.

Usefulness of traditional technology today	Educators M	F	Total N = 20	Percentage (%)
Yes	11	7	18	90%
No or uncertain	1	1	2	10%
Total	**12**	**8**	**20**	**100%**

Without traditional technologies there wouldn't be a Solomon Islands way of life and educators understand its importance today. Ninety percent of educators agreed that traditional technology is very important in the Solomon Islands today. As indicated in the quote given below modern Solomon Islanders have a choice between traditional technology and the technologies of modern life. However, those who live in town and grew up in town will have no need for traditional technology as illustrated in the quote given below:

> *In the case of Solomon Islands I think traditional technology is still useful but if we choose to live in town then it is not useful. However, if you just earn money then go back home to the village and retire then it is useful. The intention of going home will allow you to be better prepared to fit into the village way of life for example, building a leaf house or shaping-out a canoe from a log. For those who go to make a living in town and retire in the town then traditional technology is not for them (SI'IA'F14).*

A further concern raised in the previous quote is the issue of a pension which could be the answer to those who decided to retire to the village after having lived in town all their lives where modern comforts won't be available. There were others who accepted change and the western influence, but who say that traditional technology will still be useful despite these changes. A typical quote to support this notion is given below:

> *The technology from outside is becoming more important in the lives of our people especially living in the urban areas but traditional technology is not completely forgotten. What I mean by that is for example, we live in Honiara but so often when I run out of gas, I use fire wood. I think traditional technology is useful in modern lifestyles but again we have to think about the economies of these modern technologies as well. Traditional technology is not useful if we are going to live in an urban setting for the rest of our lives, probably it over-rides the importance of traditional technology but because the setting is in the Solomons, we are not going to live in the town for the rest of our lives. We are bound to go back to our villages at the end of our working lives therefore if that is the type of life that we are living in the Solomons then traditional technology is still very important (SI'IA'M17).*

This section has shown educators' perceptions of traditional technology. The next section is a summary of the findings.

9.6 SUMMARY OF FINDINGS

The following is a summary of the findings regarding educators' perceptions of technical education, technology, technology education and traditional technology in the Solomon Islands.

As part of the study, educators were asked what their perception of the existing technical education curriculum as. The study found that 85% of educators perceived that the existing technical education curriculum needed revision and improvement because it was struggling, while 10% of educators believed it was constantly being reviewed. Educators (5%) also said that they viewed the existing technical education as just another subject. The study also focused on the purpose of technical education. Forty percent of educators said the purpose of technical education was for basic education while 30% said it was for practical application and manual activities.

Twenty percent said it was for knowledge empowerment and to train the working class-tradesmen and artesians. Another 10% said it was classroom subjects and preparation for future lifetime employment. The issue of comparing existing technical education was also raised to which educators' responded by saying that the existing technical education curriculum needed revision because it lacked support and lacks emphasis by the administrators and needed qualified teachers (80%) while 20% said it was comparable and making progress. The question of relevance was also raised. Educators (60%) responded by saying that it was relevant while 40% said only some parts were relevant.

On the issue of the level of interest in the existing technical education curriculum, educators (75%) said the students' level of interest was low, their reasons being: parental influences, limited future jobs and how the subjects were taught while 25% showed an interest. Educators were also asked their perceptions on how knowledge from further learning could help them teach technical subjects. Educators listed many areas from the top rated computing (25%) to educational tours (5%). The weaknesses of the existing technical education curriculum was also highlighted by educators. They identified four main weaknesses which they listed as: the lack of resources (40%), lack of support from administrators (25%), obsolete curriculum (20%) and a lack of education linkage and balance (15%). Educators made some suggestions in order to improve the quality of the existing technical education curriculum. The suggestions were as follows: review of the curriculum (35%), more resources needed (35%), more emphasis required (25%) and an equal timetable for technical subjects (5%).

The study also focused on educators' perceptions of technology. Educators' views of technology varied and were separated into different categories as follows: application and problem-solving (35%), knowledge and skills (25%), a process (20%), artefacts involving machines (15%) and as improved efficiency with qualities such as being faster, convenience etc (5%). The question on the kind of technology students would be 'interested' in doing at school was raised, to which educators said computing (25%), basic technology such as being innovative and creative (25%), electronics and related activities (20%), learning about other materials such as plastics, fiber-glass etc (10%), food technology such as food preservation and cooking methods (10%) and alternative agriculture with the suggestion of hydroponics farming (10%).

Educators viewed technology education in the following manner: education of technology which involves the study of technology (30%), teaching and learning with the emphasis of educating one in technology and technology activities (25%), the methods and techniques of doing things (15%), artefacts and usages of artefacts appliances such as machines and portable kitchenware appliances (15%), classroom subjects where theory and practice of technology where learnt such as industrial arts, home economics, agriculture and computing etc (10%) and knowledge and skills (5%).

The final issue raised with educators was concerning their perception of traditional technology. The study found educators' perceptions of traditional technology again varied widely. They viewed traditional technology as the methods and application of knowledge and skills (40%), cultural heritage which was developed by ancestors and passed down to present generations (30%), living technology meaning these technologies are still being practiced today (20%) and artefacts, that is, a product of human arts and workmanship (10%).

This chapter has provided the findings concerning educators' perceptions of technical education, technology, technology education and traditional technology in the Solomon Islands. The next chapter (chapter 10) will focus on a discussion of the findings of this research for both Fiji and the Solomon Islands.

CHAPTER 10

DISCUSSION, CONCLUSIONS AND IMPLICATIONS

Research is best conceived as the process of arriving at dependable solutions to problems through the planned and systematic collection, analysis, and interpretation of data. G. J. Mouly, (1978).

10.1 INTRODUCTION

This chapter focuses on the discussion, the conclusions and the implications of the findings of this research. The discussion and conclusion covers students' and educators' perceptions of the existing technical education curriculum, technology, technology education and traditional technology in both Fiji and the Solomon Islands. The implications will identify the issues and establish a base for the curriculum development process in Fiji and the Solomon Islands.

This chapter is divided into nine main sections. The remaining sections will report on the following:

10.2 Students' Perceptions of Technical Education, Technology and Traditional Technology in Fiji and the Solomon Islands.

10.3 Educators' Perceptions' of Technical Education, Technology, Technology Education and Traditional Technology in Fiji and the Solomon Islands.

10.4 How Can the Findings of this Research Inform the Curriculum Development Process in the South Pacific.

10.5 Conclusions.

10.6 Implications of this Research for the Development of Technology Education in the South Pacific.

10.7 Suggestions for Further Research.
10.8 Recommendations.
10.9 Concluding Comments.

Prior to commencing the main discussion it is necessary to review the five research questions as follows:

- What are students' perceptions of technical education, technology and traditional technology in Fiji and the Solomon Islands?
- What are educators' perceptions of technical education, technology, technology education and traditional technology in Fiji and the Solomon Islands?
- Does the existing technical education curriculum meet the needs and aspirations of students and educators in Fiji and the Solomon Islands?
- How can the findings of this research inform the curriculum development process in the South Pacific?
- What are the implications of this research for the development of a technology education curriculum in the South Pacific?

10.2 STUDENTS' PERCEPTIONS OF TECHNICAL EDUCATION, TECHNOLOGY AND TRADITIONAL TECHNOLOGY IN FIJI AND THE SOLOMON ISLANDS

This section will focus on a discussion of students' perceptions of technical education, technology and traditional technology in Fiji and the Solomon Islands. This discussion will draw on the literature provided by previous research studies (Burns, 1992; Hendley & Lyle 1996; Jarvis & Rennie 1995, 1996, 1998; Kent & Towse, 1997; Raat, De Klerk Wolters & de Vries, 1987; Rensburg, Ankiewicz & Myburgh, 1999 and; Volk & Ming, 1999). It will also link with the discussion of students' perceptions of technology and technology education in Chapter 3 and Chapter 4. Further links will also be made with other areas such as the existing technical education curriculum (Chapter 2) technology and technology education (Chapter 4) and, traditional technology (Chapter 6 and Chapter 8) in this thesis. A comparison of similarities and differences between students' perceptions with educators' perceptions on existing technical education, technology, and traditional technology will also be made where required (See Appendix F (1), Appendix F (2), Appendix F (3), Appendix F (4) and Appendix F (5) for a comparison summary). The following is a discussion of students' perceptions of technical education, technology and traditional technology in both Fiji and the Solomon Islands.

- **Students' perceptions of the existing technical education curriculum**

This section will discuss three issues concerning the existing technical education curriculum in both Fiji and the Solomon Islands, as follows: (a) comparison of technical subjects with other school subjects, (b) level of interest in technical education subjects and, (c) perceived relevance of the existing technical education curriculum.

Comparison of technical subjects with other school subjects

When comparing the existing technical education subject with other school subjects, students from Fiji commented that the existing technical subjects are important, useful but need improvement and revision (73%). The reason that the existing technical subjects were considered important and useful were in terms of further education and for their future careers. Students from Fiji stated that there is a lack of facilities and equipment, which to them indicated a lack of support from the authorities. There was a call by students for a change in content and up-grading, that is, to put technical subjects on a par with other school subjects and the latest technological knowledge for the technical education curriculum.

In the Solomon Islands, students said the existing technical subjects need improvement (47.5%) due to out dated content, however, they considered them useful (47.5%) and to prepare citizens for the future (5%). The view expressed by Solomon Islands students that the existing technical education subjects need improving, again suggests that the existing technical subjects lack credibility compared with academic subjects. Students generally considered there to be a lack of; resources, funding, qualified teachers and relevant content, as shown by the data presented in chapter 6 and chapter 8.

Possible reasons for students of both countries viewing the existing technical subjects as important, useful and preparing citizens for the future include: (a) job security, the development of Fiji and the Solomon Islands economically (they both have an agro-based dependency), (b) exposure to technological hardware and systems domestically and internationally. A comparison of students' perceptions with educators' perceptions on the existing technical education subjects showed that both groups perceived it as important and useful but needing revision and improvement (See Appendix F (5) for comparison summary). This study showed that students felt the existing technical education subjects, when compared with other subjects, needed improvement and revision.

Students' level of interest in technical education subjects

This study highlighted students' level of interest in technical education whereas previous studies (Burns, 1992; Raat, De Klerk Wolters & de Vries, 1987; de Vries, 1991; Rennie, 1987; Volk & Ming, 1999) highlighted students' level of interest in technology. The study conducted by Burns (1992) in New Zealand with 1, 469 Form 3 students showed that both boys and girls are equally interested in technology. The study conducted by Raat, De Klerk Wolters, de Vries (1987) in the Netherlands with students aged 13 and 14 years showed interest in technology. The study conducted on students by Rennie (1987) showed a general interest in technology. The study conducted by de Vries (1991) in Holland on 89 student teachers showed students appeared to be interested in technology while the study conducted by Volk and Ming (1999) in Hong Kong on 3, 500 junior secondary students claimed that both boys and girls showed an interest in technology although more so with the boys.

This research found that the responses of students from Fiji and the Solomon Islands on the level of interest in the existing technical education were different. Not all of the students interviewed were technical education students. There was a high level of interest expressed by Fiji students (67%) compared to students in the Solomon Islands (30%). The high level of interest in Fiji could be attributed to the advancement Fiji has made in technological development and the length of exposure to technical education subjects in the school system. It could also reflect the advanced education system Fiji has compared to the Solomon Islands (See Chapter 2 for the established TVET programmes). The reason for the low level of interest in technical education in the Solomon Islands could be a reflection of the education system where technical education was given a low priority. Another possible reason is that Solomon Islands parents, guardians and relatives would prefer their children to be academically educated. A further comparison was made of students' and educators' perceptions of both Fiji and the Solomon Islands on students' levels of interest in the existing technical education. The result was similar in that educators (40%) from Fiji stated interest while 75% of educators in the Solomon Islands stated non-interest. Both Fiji students and educators showed that students had a high level of interest in technical education subjects while Solomon Islands students and educators revealed that there was a low level of interest (See Appendix F (1-5) for comparison summary of students' and educators' perceptions on existing technical education). This findings could promote a more positive attitude towards technology education in the future.

This study showed that there was interest in the existing technical education curriculum in both Fiji and the Solomon Islands students and educators although Solomon Islands students and educators showed less interest than their Fijian colleagues.

Perceived relevance of the existing technical education curriculum

Both students of Fiji and the Solomon Islands said that the existing technical education curriculum was relevant. This result was also similar when compared with educators' perceptions from both Fiji and the Solomon Islands. However, the overall results from several issues raised concerning the existing technical education indicated a revision of the existing technical education is necessary. For example, 88% of Fiji educators indicated revision and Solomon Islands educators (85%) it needed revision. When compared with other subjects, Fiji educators (67.5%) indicated the technical curriculum needed improvement and revision while Solomon Island educators (75%) indicated it lacked emphasis and needed revision. In Fiji, students (95%) stated that the existing technical education curriculum was relevant. It was suggested that because Fiji is still a developing country it needs skilled expertise in technical areas. In qualifying their reasons students stated that Fiji needed more trained technical people to develop the untapped resources of the country.

Students' perceptions on the relevance of the existing technical curriculum compared with educators' perceptions showed both students (90% Fiji and 95% Solomon Islands) and educators (50% Fiji and 60% Solomon Islands) agreed that the existing technical education curriculum is relevant (See Appendix F (5) for comparison summary of students' and educators' perceptions).

This study showed that both students of Fiji and the Solomon Islands agreed that the existing technical education curriculum is relevant (Fiji students 95% and Solomon Islands students 90%). However, the researcher interpreted this to be referring to technical education as a subject and not the content because students' perceptions concerning the existing technical education curriculum revealed that it needed improvement (95% for Fiji students and 47.5% for Solomon Islands students). The outcome of this research was similar to the New Zealand situation in the 1970s and the 1980s when the relevance of the national curriculum and the technical education curriculum (technicraft) was in question (Burns, 1997; Jones, 1999; McGee, 1997).

- **Students' perceptions of technology**

The discussion in this section focuses on students' perceptions of technology and covers the following issues: (a) perceptions of technology, (b) examples of things students perceived as technology, (c) reasons for choosing the previous examples as technology, (d) reasons for liking technological things, (e) kinds of technology students would like to learn at school, (f) kinds of technology students would be interested in doing at school and, perceptions of doing technology at school. These issues are discussed below.

Perceptions of technology

Students' perceptions of technology in both Fiji and the Solomon Islands varied widely. This is similar to Rennie and Jarvis (1995, 1996 & 1998) where students held a variety of ideas about technology. Furthermore, de Vries' (1991) study on 89 student teachers found that students have a fairly broad understanding of technology with some biases.

In Fiji, students initial perceptions of technology were divided into five categories as follows: artefacts (33%), recent phenomenon (33%), improved efficiency (17%), application and techniques (15%) and problem-solving (8%). The term artefacts here refers to things such as machines, computers, trucks, cars, aircrafts, kitchen appliances, farming machines and equipment, buildings and shelters etc which are tangible and visible. Something that is real and something which students can feel and touch is technology. Their existence and tangibility makes a great difference to the application and techniques (15%) and problem-solving (8%). The term artefacts here refer to things such as machines, computers, trucks, cars, aircrafts, kitchen appliances, farming machines and equipment, buildings and shelters etc which are tangible and visible. Recent phenomenon referred to concepts such as the latest, newest, modern, advanced, foreign, overseas and inventions, are technology to students. Therefore, to students machines, a plane or a vehicle which is the latest, new, modern, and most advanced is technology. Students from Fiji would also equate anything from abroad or from overseas which is tangible or which performs a task better than the ones available locally as technology.

When asked for examples of technology Fiji students gave artefacts (92%) and process (8%) as technology. Examples of artefacts given by Fiji students included electrical devices which can be listed in the subculture of electrical jugs, electrical razors, electrical fans, electrical house-hold appliances etc. Other examples of artefacts as technology by Fiji students with their subcultures included machines, vehicles, tools and engines etc. Examples of processes given by Fiji students included application of theoretical knowledge to practical skills, the techniques of cooking, the development of the design project or a construction of a house (See Chapter 6 on examples of things students perceive as technology, pp. 134-135)

The Solomon Island students on the other hand divided technology into three categories namely application (45%), recent phenomenon (35%) and artefacts (17.5%). Again the categories created from Solomon Islands students answers were similar to previous studies by Rennie and Jarvis (1995, 1996 & 1998) in which students showed an enormous variety of ideas about technology. Solomon Islands students consider 'applications' high on their list as technology and view application as synonymous with technique, creating, developing and the improvement of living standards. Furthermore, the application of knowledge and instruction of students by teachers is technology. The use of hands to construct a project for example, is technology. The development of the physical geography in the country such as construction of roads, bridges and dams is technology to students. The high choice of application by Solomon Islands may be as a result of the influence of their up-bringing because their cultural lifestyle is all about practical application whether it be fishing, cooking, farming, building a house, climbing a tree or preservation of food, all involve application of one kind or another. This issue of technology deriving from society was also highlighted by Burns (1992) which was not recognised by students. Recent phenomenon is again viewed as technology by students from the Solomon Islands and this includes artefacts and machines which have the following characteristics being new, the latest, modern, introduced, foreign, specialised, amazing and having an ability to perform tasks.

When asked for examples of technology, students from the Solomon Islands gave the following: transportation system (27.5%) such as planes, boats, cars etc; computer (17.5%) such as high tech gadgets; shelter (12.5%) such as houses, school etc; fishing tools (10%) such as spears, goggles. etc; artefacts (5%) such as bulldozers, chainsaws etc; farming tools (5%) such as digging fork, spades etc; kitchen ware (5%) such as stoves etc; and medical equipment (5%) such as stethoscopes etc.

The examples given by students of both countries are similar even though they came from different backgrounds and up-bringing. Previous studies by Jarvis and Rennie (1995, 1996 & 1998) also indicated a variety of ideas and examples of technology by students although computer and high-tech (de Vries, 1991) were strongly associated with technology. However Burns' (1992) study revealed that students have a limited view of technology and could not relate it to technological products, therefore it could be said that students could not give wider examples of things they perceived as technology. The same difficulty in experience was also highlighted by Raat, De Klerk Wolters, de Vries (1987) study.

A comparison of students' perceptions of technology was also made with educators' perceptions and the result showed that there are similarities and differences in emphasis. Students viewed technology as artefacts, recent phenomenon, improved efficiency, and application and problem solving. On the other hand educators viewed technology as recent phenomenon, application and problem-solving, process, artefacts and improved efficiency. Fiji students' first choices were artefacts (machines, cars, electric jug etc) whereas educators' first choices were recent phenomenon (modern, faster, the latest etc). Both groups agreed on application (problem-solving) and improved efficiency (assist humans and make life easier). See Appendix F (5) for details.

This study showed that both Fiji and Solomon Islands students listed artefacts (something tangible and foreign) as technology, things that offered an improved efficiency and had the ability to perform tasks (de Vries, 1991). They illustrated artefacts with examples such as boats, bulldozers, trucks and electric power driven machines etc. Their similarity in choices of technologies indicated that both countries are experiencing an influx of new technologies from abroad.

When asked what they liked about technology students mentioned improved efficiency. Improved efficiency for these students means easier, faster, comfortable, accessible and the ability to perform a task better is regarded as technology by students. The issue concerning recent phenomenon concurred with findings from a study by de Vries (1991), where students regarded high-tech things as technology.

The issue of improved efficiency showed results also agreed with Burns' (1992) study, where students recognised the benefits which come from the use of technology products. Students from Fiji also viewed technology as an application and technique. For example, in a woodwork class project, the making of a dovetail joint, the construction of a model house or the applying of a finish onto the surface of furniture is technology because all of these require applications and all these require certain techniques and skills or specific procedures or ways to complete them. Students also perceived problem-solving as technology. For example, trouble-shooting when a car does not start and using the process of elimination in getting it started is technology or a brain-storming session during designing a project would be technology to students because this entailed problem-solving. This improved efficiency through technology in assisting humans can be useful as seen in the comfortable lifestyle of developed countries such as Australia, New Zealand, USA and UK.

When asked what they like about technological things students from Fiji gave the following as reasons: improved efficiency (58%), recent phenomenon (20%), mana (12%) and aesthetically designed (10%). The selection of improved efficiency as a reason for liking technological things again was because of qualities such as easy, fast and the additional answer of being helpful and beneficial (de Vries, 1991). Other reasons for liking technological things are recent phenomenon and mana. Another reason Fiji students gave for liking technological things was that they were aesthetically well designed. This referred to artefacts such as a dressing table, a car, a motorbike, computer, a watch, a house etc with the emphasis on the shape and the appearance of the artefacts which were designed to catch the attention of clients and customers with the underlying motive of being pleasing to the eye.

Students from the Solomon Islands on the other hand gave their reasons for choosing the previous examples of technology as improved efficiency (37.5%), recent phenomenon (30%), man-made products (15%), fascinating (12.5%) and application (5%). The reasons for choosing improved efficiency of technology for example, planes, boats etc were similar to their Fijian colleagues with the addition of speed and going faster as other qualities or characteristics of technology. Reasons given by Solomon Islands students for liking technological things included improved efficiency (65%), usefulness and beneficial (17.5%), recent phenomenon (15%) and aesthetics (5%). The reasons for improved efficiency are similar to what has been described previously however the other reason for students in the Solomon Islands to like technological things was their usefulness and that it is beneficial (Burns, 1992; de

Vries, 1991). A quality which has not been highlighted under usefulness and benefits was the practicality and functionality of technological things for example, the computer is a very practical and functional artefact whether it be at home, school or work. The other two reasons for liking technological things for Solomon Islands students was recent phenomenon and aesthetic which were discussed previously.

This study showed that the reasons students chose for liking technology or technological things were based on the following (a) improved efficiency, (b) recent phenomenon, (c) man-made products, (d) technical processes and, (e) fascination and aweness. This research also revealed that the reasons for liking technological things from students of both Fiji and the Solomon Islands were because of (a) improved efficiency, (b) recent phenomenon, (c) useful and beneficial, (d) mana and, (e) aesthetic.

Kinds of technology students would like to learn and do at school

Students from Fiji chose the following as types of technology they preferred: computer studies (42%), basic intermediate technology (38%), craft education (12%), recent phenomenon (3%) and only 5% had no interest. Students from Fiji stated that the reason for selecting computing was because computing with its drafting and designing software would be useful in the future. In studies by Rennie and Jarvis (1995 & 1996), computing was associated with modern appliances. Basic intermediate technology such as learning basic concepts and knowledge and modelling them out of paper, sheet metal, cardboard and pieces of wood is important to students. Other basic technology types which are of interest to students included wood, project design and making, building and construction and other related areas of technology. Interest was also shown in craft education. Interest in the latest technology (recent phenomenon) which is challenging was another area of interest. Students also indicated that they would like to be given the opportunity to choose and pursue a technology that they were interested in. This was highlighted because the current system of education could be so rigid and so structured that there was no room for flexibility for students to make their own choice regarding what type of technology they were interested in pursuing. The study by Rensburg, Ankiewicz and Myburgh (1999) on 500 girls and 510 boys indicated that technology should be focussed on satisfying human interests, needs and aspirations.

Solomon Island students also listed the following as the types of technology they would be interested in doing at school: computing (35%), electronics (12.5%), wood and metal technology (12.5%), inventive type technology (10%), designing and project making (7.5%), hydroponics agriculture (7.5%), home economics (5%), fishing (5%), and own their choice (5%). Electronics is an area that is high on the students' lists, which indicated that students are interested in high-tech types of technology. The choice of electronically driven high-tech machines was also a choice indicated by students in de Vries (1991) study. Wood and metal technology is another area students would be interested in and the reasons for this was that they could make something useful for their homes. The inventive type technology was chosen because students would be given the chance to be creative, while designing and project making technology would give students the opportunity to put it into practice. Other types of technologies (22.5%) students were interested in doing at school included hydroponics agriculture, home economics and fishing. Again Solomon Islands students suggested that they should be given the opportunity to pursue a technology which interested them and not one imposed on them.

A comparison of the kind of technology students would be interested in doing at school was made with educators' perceptions. There were similarities and differences. Both chose computing as the first preference and agreed on basic technology (high-tech) such as electrical, electronics and mechanical and recent technology (alternative) such as hydroponics agriculture. They had a different emphasis on arts and crafts, material technology, and food technology. Furthermore, students in particular insisted that they be given the freedom to choose what type of technology they wished to pursue, which brings up the issue of schools providing more options and opportunities for students.

Perceptions of doing technology at school

Fiji students' perceptions of doing technology at school included: broadening of knowledge (42%), practical activity (30%), learning process (17%) and improving skills (12%). The broadening of knowledge to Fiji students meant being exposed to knowledge, gaining knowledge, and having knowledge for the future, learning new ideas and educating oneself. Doing technology at school to Fiji students meant practical activities which include making things by hand, designing things such as using a technical drawing set or by using the computer drawing package AutoCAD LT. Students also viewed practical activities as actually being involved in doing something and being involved through participation. This reinforced the traditional concept of learning through participating in traditional activities as advocated by Ki'I (1994). A very important aspect of doing technology at school is that it is an individual effort as pointed out by students. Furthermore, students regarded practical activity in the classroom such as project making is doing technology. Students also viewed doing technology as a learning process where they learn new ideas, for new technology, practical skills and knowledge.

The Solomon Islands students divided doing technology at school into three parts as follows: application of practical activities (45.5%), broadening and improving of knowledge and skills (35%), and preparation for the future (17.5%). Solomon Island students' interpretation of doing technology at school was as an application of practical activities, and was similar to Fiji students' ideas of practical activities. Application of practical activities according to Solomon Islands students involved the making of things by hand, building, creating and improving existing things. In a classroom doing technology would be the application of theoretical knowledge to practical activities such as project making etc. Students further stated that doing technology at school is also broadening and improving knowledge and skills and this was qualified by two words, understanding and learning. Students illustrated the notion of the application of practical activities in preparing a dish of pudding or when fixing a machine or repairing a bicycle.

- **Students' perceptions of traditional technology**

This section will discuss four areas regarding students' perceptions of traditional technology as follows: (a) knowledge of traditional technology in students' own culture, (b) examples of traditional technology, (c) reasons for learning traditional technology and (d) usefulness of traditional technology today.

Knowledge of traditional technology

This study showed that the majority of students from both Fiji and the Solomon Islands were aware of the existence of traditional technology in their culture. Evidence of this was shown through the numerous examples given by students about their own culture. The reason for this wealth of knowledge in traditional technology could be credited to their own educational system, which according to Ki'i (1994) is the participatory system of education.

In Fiji, 77% of the students indicated having knowledge of traditional technology while 13% said they did not know and 10% said they were not sure. The number of students who did not have any knowledge of traditional technology and those who were unsure about what traditional technology was, made up 23% of the students interviewed. Their ignorance of the existence of traditional technology could be attributed to their upbringing. These could be the students who were born in town, grew up in town and did not visit the villages of their parents. In many cases in Fiji, it was the parents who did not encourage their children to know about the old traditional ways, and in doing so limited their childrens' opportunities to know their own culture and they are therefore culturally ignorant.

In the Solomon Islands 95% indicated that they had knowledge of traditional technology, while 5% did not have knowledge. The high percentage of students who knew their traditional technology provided strong evidence of the emphasis and exposure Solomon Islands students have to their traditional technology. Reasons for students having knowledge of traditional technology for both Fiji and the Solomon Islands could be due to (a) the practice that all children born into the society have to participate in cultural activities and (b) the majority of people in both countries still live in rural areas where these technologies were still being practiced today. The dependency on rural lifestyles as a way of life could be a further explanation of students' awareness of traditional technology.

This research showed that students of both Fiji (77%) and the Solomon Islands (95%) are very aware, know and have a good knowledge of their traditional technology. This is opposite to Burns (1992) study which showed that students did not recognise that technological development originated from within society.

Examples of traditional technology

As evidence of their knowledge of their own traditional technology many examples were given. They were listed under themes for example, in the Solomon Islands cooking was mentioned as it uses traditional methods which included: cooking food using bamboo, cooking over the fire such as roasting, cooking by steaming, cooking using earthenoven, cooking using a clay pot and cooking by smoking fish etc.

In Fiji, examples of traditional technology included: cooking (18%), transport (13%), building 13%), fishing (13%), handicraft (10%), farming (10%), tools and weapons (7%), while manners and protocol, dress and customs, folklore and dances and, communication (11%). Only 3% of the students in Fiji could not give examples because they did not know any. The reason for this could be that they may have been born and raised in town, and they had not visited the village, therefore they had not been exposed to traditional technology.

The list of examples of traditional technology given by Solomon Islands students included: the making of a canoe (20%), fishing methods and techniques (17.5%), traditional houses (15%), preservation of food (7.5%), weaving of mats and hats (7.5%), farming methods (7.5%), preparation of herbal medicine (5%), stone axe and digging sticks (5%), preparation of food and cooking of food (5%), bows and arrows, stone carving, making of traditional musical instruments and bird's traps and snares (10%). The Solomon Islands in particular has a very high percentage of students indicating a thorough knowledge of traditional technology. This is because traditional technology is a way of life. Most students were from the rural areas and they would have been exposed to, (seeing, touching, involved) and participated in, performing various traditional forms of technology.

This study showed that because of their thorough knowledge of their traditional technology, students of both Fiji and the Solomon Islands were able to give numerous examples of traditional technology.

Reasons for learning traditional technology

The reasons for learning traditional technology given by students from Fiji was for the identity and the survival of the Fijian culture (95%) while 5% of students stated it is no longer applicable today. The phrase 'identity and survival of the Fijian culture' was the combination of many reasons given by Fiji students during the interviews. The phrase also suggested that Fijian traditional technology is under threat from other cultures and this could be the reason for such responses. This study revealed that students are very concerned about the identity and survival of their own ethnic group, as they are proud of their traditional culture and traditional technology. The reason for Fiji students' concern for their identity and the survival of the Fijian culture could be because of the indifferent attitude towards traditional culture by some citizens of Fiji. Fiji students do not want their traditional technology to be a forgotten culture and to only exist in the museums. Fijians still want their traditional technology to be a living technology, a traditional technology which is meaningful and makes sense to their people. The experience of being colonised by the early missionaries in the South Pacific was not a pleasant one, because missionaries condemned many traditional practices and destroyed a lot of traditional culture. This process has caused the extinction of many traditional technologies in the South Pacific (See Chapter 2, page 16). The western culture is a powerful force which can destroy other cultures but in the contemporary Fijian society both are needed as they both play significant roles in the development of a nation such as Fiji. In the rural setting of the Fijian village, traditional technology is still being practiced while in the modern urban Fijian setting, western technologies are being enjoyed. This in fact, is the Fijian way of life today therefore the choice whether to learn Fijian traditional technology is their own individual choice.

In the Solomon Islands, the reasons students gave for learning traditional technology was the preservation of culture (67.5%) while 32.5% said it was beneficial. The phrase 'preservation of culture' was qualified by such words as identity, heritage and part of the lifestyle. The phrase 'preservation of culture' also implies that the Solomon Islands is under threat from an outside culture which, in this case is the western culture, as this is the only culture with great influence outside traditional Solomon Island culture today. According to Solomon Island students this is the reason for learning traditional technology. The western culture is an international culture, therefore the Solomon Islands cannot escape it and its' adoption, and making it a modern Solomon Island culture is inevitable. For that reason many young Solomon Islanders do not want to learn traditional culture as it will no longer be useful in their lifetime. The other reason was the influences of the missionaries. The church still dictates the lifestyle to the people in the Solomon Islands just like their founding missionaries when they first landed in the Solomon Islands. Solomon Island students also stated that traditional technology is beneficial and this was qualified by words such as economic reasons, cheap, easy and important.

This research revealed that the reasons students of Fiji and the Solomon Islands learnt traditional technology were (a) maintaining identity, (b) preserving and survival of culture, and (c) beneficial.

Usefulness of traditional technology today

The responses from students of both Fiji and the Solomon Islands regarding the usefulness of traditional technology today were the same. The majority of students (92%) from Fiji stated that it is still useful today and Solomon Island students (89.5%) also stated it is still useful today. The reasons given by students in Fiji was that it still has a place in society and it is still being practiced in many rural areas. It is still very practical, useful and an easy way of life.

Solomon Island students gave their reasons as still being part of the way of life therefore it would still be useful. According to Solomon Island students the continuation of traditional technology is guaranteed by the economic pressure from the western way of life. Many Solomon Islanders cannot afford the luxuries of the western way of life, therefore they will always live their lifestyle the traditional way which is easy, cheap, costs nothing and one which they can afford and depend upon. The majority of Fijian and Solomon Islanders are rural dwellers and are dependant on their surroundings for their livelihood, therefore for both Fijians and Solomon Islanders, traditional technology is still very useful today. The discussion of traditional technology has shown that students of both countries have a thorough knowledge of traditional technologies as shown in the examples given and traditional technology is still very useful today.

A comparison of students' perceptions and educators' perceptions on the usefulness of traditional technology today was conducted. There was a similarity in that, the majority of students (92% from Fiji and 87.5% from the Solomon Islands) and the majority of educator (77.5% of Fiji and 90% of Solomon Islands) agreed that traditional technology is still very useful today.

- **Summary**

This discussion of student's perceptions of both Fiji and the Solomon Islands highlighted similarities and differences of the existing technical education curriculum, technology, technology education and traditional technology. The similarity was that students' perceptions of technology and those from previous studies (Rennie & Jarvis, 1995, 1996 & 1998) showed students have different ideas of technology, with a different emphasis and various degrees of biases. These similarities could be influenced by cultural up-bringing, geography and level of education. An important similarity is the choice of computers as technology by all students and that it is associated with modern appliances such as high-tech and assisting humans with work. The differences in this research with other studies was that it highlighted information not previously known such as an understanding of the perceptions of students and educators from Fiji and the Solomon Islands in technical education, technology, technology education and traditional technology. This discussion also contributed to the information for the base of the recommendations made in section 10.10. A comparison summary between students' perceptions and educators' perceptions is also provided in Appendix F (1), Appendix F (2), Appendix F (3), Appendix F (4), and Appendix F (5). The next section will discuss educators' perceptions of the existing technical education, technology education and traditional technology of Fiji and the Solomon Islands.

10.3 EDUCATORS' PERCEPTIONS OF TECHNICAL EDUCATION, TECHNOLOGY, TECHNOLOGY EDUCATION AND TRADITIONAL EDUCATION IN FIJI AND THE SOLOMON ISLANDS

The discussion of educators' perceptions of technical education, technology, technology education and traditional technology is given below. Links with previous studies (Jarvis & Rennie, 1996; Jones & Carr, 1992; Ginns, McRobbie & Stein, 2000; Rennie, 1987; Symington, 1987) will also be made. Other sources of information regarding educators' perceptions (Chapter 4 on educators' perceptions of technology, Chapter 7 on educators' perceptions and, Chapter 9 on Solomon Islands educators' perceptions) will be discussed. Links will also be made with educators and students and a comparison summary outline is provided in Appendix F (1), Appendix F (2), Appendix F (3), Appendix F (4), and Appendix F (5).

- **Educators' perceptions of existing technical education**

Eight questions were presented to educators in order to understand their perceptions of the existing technical education curriculum of both Fiji and the Solomon Islands as follows: (a) perceptions of the existing technical education, (b) perceived purpose of technical education, (c) comparison of the existing technical education curriculum with other curriculum, (d) relevance of the existing technical education curriculum, (e) educators' perceptions of students' level of interest in the existing technical education curriculum, (f) perceptions of how further knowledge in other subjects will help in the teaching of technical subjects, (g) weaknesses of the existing technical education curriculum and, (h) suggestions to improve the quality of the technical education curriculum. Discussions of the eight questions are presented below:

Perceptions of the existing technical education curriculum

Educators from both Fiji and the Solomon Islands agreed that the existing technical education curriculum needs revision. The majority of educators (87.5% in Fiji and 85% in the Solomon Islands) stated that the existing technical education is outdated and needs revision.

In Fiji, 87.5% of educators said that it needs revision while 12.5% said it was adequate. The reasons given to review the existing technical education curriculum by educators included an out-of-date curriculum, the existing technical curriculum needs changing, needs to be expanded as it needs depth, needs to be linked with other class levels, needs to establish an identity (identity crisis) and it needs to be improved.

These are deep-seated problems which need to be addressed and they are all related to one another. These interlocking issues are interwoven therefore making it more complicated. All the reasons given imply that the existing curriculum is not appropriate and not relevant to Fiji.

In the Solomon Islands, educators said the technical education curriculum needs revision and improvement because it is struggling (85%), it is constantly being revised (10%) while others (5%) viewed it as just another subject. The term struggling suggests that it is not developing, it is not up to standard and is lacking quality. The term struggling includes words such as overlooked, lacking basic elements, lacking equipment and not emphasised. Educators in the Solomon Islands also said that the existing technical education curriculum is constantly being reviewed. Since the curriculum is struggling and constantly being reviewed this could mean that only parts of the curriculum could be up-graded. This may suggest that there is also a lack of qualified teachers, and the qualified teachers are also lacking in certain areas so they need further training assistance. A further issue which was highlighted by educators, was that students perceived the technical subjects as just another subject. The reason for a suggestion to review curriculum for both educators of Fiji and the Solomon Islands was because (a) educators were involved in curriculum development and, (b) by teaching technology curriculum content teachers could see that the content is no longer relevant to today's way of life. Evidence of efforts to improve the existing technical education curriculum in the Solomon Islands includes the Maetia report (1996) and the Treadaway report (1996). Another effort to improve technical education in the South Pacific was the inclusion and introduction of technology into the South Pacific Board of Assessment (Zindel, 1999).

This study showed that the majority of Fijian (87.5%) educators and Solomon Islands (85%) educators stated that the existing technical education curriculum is out of date and needs revision. A comparison made between educators and students also confirmed this (See Appendix F (2), Appendix F (3), Appendix F (4) and Appendix F (5). This new information gained from Fiji and Solomon Island educators contributed to knowledge in the existing technical education curriculum. The scenario of this study is similar to the New Zealand education reform experience of 1984 and 1991 (Bell, Jones & Carr, 1995) which resulted in the shift from technical education (Burn, 1992) to technology education (Jones 1999; Jones & Carr, 1992).

Perceived purpose of technical education

Educators' perceptions on the purpose of technical education in both Fiji and the Solomon Islands were similar but different in emphasis. No previous study was conducted on perceived purpose of technical education.

In Fiji, educators stated that the purpose of technical education are: (a) basic education (47.5%), practical education (40%), sustainable knowledge (7.5%), and a classroom subject (5%). Educators from Fiji qualified their choice of basic education with such words as educate, delivery, introducing and preparation for life. In the study conducted by Rennie (1987) technology was viewed by teachers as improving the quality of life.

In the Solomon Islands basic education (40%) was also the first choice. This basic education was qualified by such words as the passing on of knowledge and skills to the next generation. This choice could be based on the fact that the daily activities are those which fulfil daily basic needs, which technical education seems to provide. The other categories for the Solomon Islands included practical application and manual activities (30%), knowledge empowerment (10%), tradesmen and artesians (10%), classroom subjects (5%) and preparation for work (5%).

This study revealed that educators' perceptions of the purpose of technical education included: (a) basic education, (b) practical education, (c) knowledge empowerment, and (d) preparation for life's work (See Appendix F (2) for comparison summary of the purpose of technical education).

Weakness of the existing technical education curriculum

Past and present technical teachers have always been aware of and have been concerned about the weaknesses of the existing technical education curriculum. This research has confirmed these weaknesses and they have been documented here. These weaknesses are similar in nature in both Fiji and the Solomon Islands (See Chapter 7, pp. 158 – 160 and Chapter 9, pp. 210 – 212).

Educators in Fiji listed the following as the main weaknesses of the existing technical curriculum: lacking resources (42.5%), lacking linkage and continuation (15%), obsolete curriculum (12.5%), lacking support and coordination (10%), does not cater for peoples' need (5%), attitude and implementation problems (5%), foreign curriculum (5%), and lacking hands-on experience (5%). Under lack of resources the main draw-backs were listed as lack of funding, lack of equipment, lack of expertise, lack of up-to-date textbooks and lacking facilities. All of these were emphasised by educators as being key obstacles for the development and progress of the existing technical education curriculum. Should these things be available to students, technological literacy would have been much more advanced and learning would be greatly enhanced. The other major concern with the existing technical education curriculum in Fiji was the lack of linkage from one class level to another class level to guarantee continuity in the learning process. Another major weakness of the existing technical curriculum is the description of it as an obsolete curriculum. According to educators, the existing technical curriculum was developed in the 80's and therefore students of technical education could not be expected to apply the technology and skills of the 80's to the 21st century.

In the Solomon Islands the list included the following: lack of resources (40%), lacking support from the government, authorities and administrators (25%), obsolete curriculum (20%) and lack of continuity between levels of education and balance (15%). According to Symington (1987) the lack of support was due to a negative attitude towards technology and to improve the attitude, an appropriate in-service training programme must be put in place. The weaknesses of the existing technical education curriculum, as highlighted by Solomon Island educators, is similar to the list presented by their Fijian counterparts as the two countries have had similar educational histories. Therefore the reasons for these weaknesses would also be similar. An observation which may need attention was concerning the lack of continuity between levels of education and balance in the Solomon Islands' technical education curriculum. This notion of the lack of continuity between levels of education and balance could be referring to students who have gone overseas to attend universities but could not cope because they did not have the necessary background knowledge of technology as a prerequisite. The issue was highlighted by educators of both Fiji and the Solomon Islands as significant in the development of the technology education curriculum for the South Pacific.

It is evident from this research that there are weaknesses in the existing technical education curriculum as highlighted by educators from both Fiji and the Solomon Islands. The experience of this study is similar to the background and reasons for developing technology education as a school curriculum internationally (Dyrenfurth, 1994; Layton, 1994; Jones & Carr, 1993; McComick at al, 1992; McCulloch, 1992; McGee, 1997; Kananoja, 1994), where technical education was replaced with technology education because of perceived weaknesses such as not fulfilling the needs and aspirations of the people.

Suggestions to improve the quality of the technical education curriculum

After highlighting the weaknesses of the existing technical education curriculum in the previous discussion (See Chapter 7, pp. 158-160 & Chapter 9, pp. 210-212), the next section will offer suggestions for the improvement of the technical education curriculum (See Chapter 7, pp. 160-162 & Chapter 9, pp. 212-213). The suggestion for a broad based technology education curriculum is similar to the one provided by Swernofsky (1989) of an 8-point technology education concept-based and cluster-based approach.

Educators of Fiji made the following suggestions to improve the existing technical education curriculum: revise curriculum (32.5%), general suggestions (20%), train quality teachers (10%), introduce support areas (10%), establish continuous linkage between different levels (5%), recruit quality students (5%) and the rest (17.5%) including the establishment of a pool of expert resources, better coordination mechanisms, a continuous in-house service training programme, produce local materials, establish a revolving fund, establish a mobile technology unit and scraping the subject division. Educators of Fiji stated that when revising the existing technical education curriculum there should be an up-grading of the content and this should begin at primary school. Introducing technology at primary school is a good suggestion for the following reasons: (a) students will have an early start in understanding technology, (b) students will have a broader and deeper understanding of technology, (c) students will have a longer association with technological knowledge and (d) students will have a much more advanced knowledge of technology by the time they graduate from (Class 6) primary and senior classes (Form 7) in high school. This could also lead to a deeper understanding of concepts, influences, usages, impact and applications of technology.

The combination of suggestions was termed general suggestions, which included the adjustment to change, less focus on assessment, and the establishment of more vocational schools. Fiji, unlike the Solomon Islands, does not have many vocational schools and an increase in vocational schools could allow more opportunities for many more students. Another important suggestion was the training of quality teachers and enrolling quality students. These two suggestions could make a lot of difference to the standard of the existing technical education curriculum. The idea of having better teachers and quality students would mean better results and performances from students. The suggestion of establishing a pool of expertise is a unique one, because it would mean specialisation in the various areas of technical education. At the moment teachers are general teachers within the area of technical subjects (Jones & Carr, 1992), but they are not specialists in specific technical subjects, such as electronics, materials, food technologists, fabrics and designing processes.

Educators from the Solomon Islands made the following suggestions for the improvement of their existing technical education curriculum: review curriculum (35%), more resource allocation (35%), more support and emphasis (25%) and, equal timetable (5%). The list of suggestions provided by Solomon Island educators was similar to the ones given by their colleagues in Fiji. The reasons for these similarities could be due to geographical location and educational history. The suggestion to review the curriculum was further qualified by the phrase 'introduce new ideas' which implies that the existing technical education curriculum is obsolete and outdated and requires fresh ideas and the latest knowledge and applications. They also reiterated the previous suggestions of having better trained teachers, more funding and better facilities. The suggestion of more emphasis being placed on the existing technical education curriculum was qualified by the phrase: make it more attractive and make it create more jobs, which suggested that the existing technical education curriculum was unattractive and it lacked the ability to create more jobs. The problem of having an equal timetable as highlighted by educators for technical education, was a reflection of the value the education system in the Solomon Islands has placed on technical education. It also implied discrimination against technical subjects and unfair dealings. All these could have caused a distraction to students and could have caused a loss of interest. The suggestion of equal time-tabling is timely as it is long overdue. The list of suggestions by both educators of Fiji and the Solomon Islands could be used as a guideline for improving the existing technical education curriculum and to help develop a broad based technology education curriculum for Fiji, the Solomon Islands and the South Pacific region.

The suggestions made by educators of both Fiji and the Solomon Islands to improve the existing technical education curriculum is a significant contribution to the curriculum development process in Fiji, the Solomon Islands and the South Pacific. A strong recommendation from educators was a revision of the existing technical education curriculum (32.5% of Fiji educators, 35% of Solomon Islands educators), and more resources and stronger financial support.

- **Educators' perceptions of technology**

Two issues are discussed in this section as follows: (a) educators' perceptions of technology and, (b) the kind of technology students would be interested in doing at school.

Educators' perceptions of technology

Responses from educators of Fiji and the Solomon Islands regarding perceptions of technology varied. This result was similar to Jarvis and Rennie's (1996) study on 142 primary teachers in England whose perceptions of technology varied. The other study which showed teachers' perceptions of technology varied was by Symington (1987) on 70 experienced primary school teachers. This research on 40 educators (32 were teachers) from Fiji viewed technology as recent phenomenon (27.5%), process (22.5%), application (20%), artefacts (15%), hardware and system (10%) and improved efficiency (5%). In comparison, the 20 educators (12 were teachers) from the Solomon Islands viewed technology as application and problem-solving (35%), knowledge and skills (25%), process (20%), artefacts (15%) and improved efficiency (5%). Both groups agreed that technology is viewed as a process, an application, artefacts and improved efficiency but they differed on recent phenomenon, knowledge, skills, hardware and systems. The study by Jones and Carr (1992) on 30 New Zealand teachers (16 primary and 14 secondary) also showed teachers talked about technology in terms of artefacts. Fiji and the Solomon Islands are two different countries therefore priorities, emphasis and perceptions are expected to be different.

Fiji educators perceived technology as a recent phenomenon which has the characteristic of being new, the latest, advanced, from overseas and a western type technology. The study by Rennie (1987) on 94 science teachers in Western Australia also viewed technology as new ideas and state-of-the-art. To better understand the reasons Fijian educators used these descriptions, one has to be aware of the geographical location of the Fiji Islands. Fiji is sometimes called the 'hub of the South Pacific' because of its geographical relation to the other island nations, Fiji is considered the centre (See South Pacific Map in Chapter 1, p. 3). Being in the centre, Fiji naturally gets world attention physically, economically, politically, socially, spiritually and technologically and therefore in a sense Fiji gets the latest technological products before any other South Pacific country (except Australia and New Zealand).

It is no wonder that technologically, Fiji people have been more exposed to more of these products then their Melanesian, Polynesian and Micronesian neighbours. Due to this international network and exposure, Fiji is much more advanced physically, educationally, industrially, economically and technologically than the other South Pacific Islands nations. Fiji educators also perceive technology as process, application, artefacts, hardware and system which also includes improved efficiency. Fiji has been self-reliant in manufactured products and processed food and this is a direct result of Fiji's proximity and accessibility to the outside world due to its international links through its' geographical location. The other impact that technology has on Fiji is the improved efficiency, which has been described by educators as 'assisting humans' with describing words (verbs) such as easier, faster, advanced and better.

Educators' perceptions of technology was also compared with students' perceptions from Fiji and the Solomon Islands. The result showed that both students and educators strongly agreed that technology is perceived as: (a) application (problem solving), (b) artefacts, (c) recent phenomenon and (d) improved efficiency. The contribution this research makes to the existing knowledge of technology is the perceptions of educators (teachers) from Fiji and the Solomon Islands on technology. This research showed that educators' perceptions of technology are consistent with perceptions from previous studies but the degree of priorities and emphasis differed.

This research showed (as other previous international studies on teachers' perceptions of technology) that (a) technology perceptions varied (Jarvis & Rennie, 1996; Symington, 1987), (b) technology perceptions were vague, as artefacts and past experience of teachers influenced the definition of technology education in the future (Jones & Carr, 1999), technology perceptions of new ideas and state-of-the-art (Rennie, 1987).

This research showed that both educators from Fiji and the Solomon Islands agreed that technology is perceived as (a) recent phenomenon, (b) application and problem-solving, (c) artefacts and (d) process, (e) improved efficiency but placed different emphasis on knowledge, skills, hardware and systems. See Appendix F (5) for a comparison summary of both educators' and students' perceptions.

- **Educators' perceptions of technology education**

The perception of educators in both Fiji and the Solomon Islands concerning technology education was similar in that they viewed technology education as the education of technology or the teaching and training of technology or the learning of the application of technology. This similarity could be a result of their experience as teachers in the school subject, technical education.

This is the first study conducted on technology education in Fiji and the Solomon Islands with 60 educators. The findings of this research could give direction for the introduction of technology education into the school system in the South Pacific.

Fiji educators' perceptions of technology education were as follows: the teaching of technology subjects (37.5%), application (27.5%), learning (22.5%) and recent phenomenon (12.5%). Teaching was educators' choice for the term technology education. It is a new term to most educators and they may have look at the words separately for example: technology and education. The choice of application as technology was further explained and elaborated on with the description of 'skill and technological knowledge, a combination of theory and practical activities in teaching' and this suggested that knowledge and skills must go hand-in-hand in a classroom situation.

Educators from the Solomon Islands viewed technology education as: the education of technology (30%), teaching and learning (25%), methods and techniques (15%), artefacts and usage of artefacts (15%), classroom subjects (10%) and knowledge and skills (5%). It is evident in this study that educators of both Fiji and the Solomon Islands perceived technology education as (a) the education of technology, (b) teaching and learning, (c) a classroom subject, (d) application of knowledge and skills, and (e) usage of artefacts.

- **Educators' perceptions of traditional technology**

Two issues were raised concerning traditional technology as follows: (a) perceptions of traditional technology and, (b) usefulness of traditional technology today.

Educators from Fiji perceived traditional technology in the following manner: cultural heritage (50%), living technology (25%), arts and craft (12.5%), introduced skills (7.5%) while 5% said that they did not have any knowledge of traditional technology. Fiji educators perceived traditional technology as a cultural heritage. This implied that traditional technology is the Fijian way of life, Vakaviti (Bakalevu, 1998), passed down to them by their ancestors by word of mouth and participatory methods. Because of the close connection with their ancestors, it is sacred and guarded with the utmost secrecy. Traditional technology was also described by educators from Fiji as living technology which implied that is it used daily. This is a typical island lifestyle as traditional technology is not seen as a set of activities only performed at certain times but it is fluid and practiced whenever applicable.

The Solomon Island educators perceived traditional technology as methods and application (40%), cultural heritage (30%), living technology (20%) and artefacts (10%). Educators from the Solomon Islands perceived traditional technology as methods and application and this could reflect the traditional way of life of the Solomon Islanders which is dominated by practical activities. This according to Ki'i (1994) is again participatory technology where people (as they grow up) take part in all daily activities.

This study showed that educators of both Fiji and the Solomon Islands viewed traditional technology as (a) cultural heritage, (b) living technology, (c) the way of doing things (techniques and application) and (d) artefacts (arts and crafts). The majority of educators from Fiji (77.5%) and the Solomon Islands (90%) firmly believed that traditional technology is still very useful today despite the strong western influence. A reason for this could be that the majority of people from both Fiji and the Solomon Islands (Hviding, 1996) still live in rural areas and still depend on traditional technologies for their livelihood and survival (Bennett, 1987; Hviding, 1996; Lasaqa, 1984; Ravuvu, 1983). Another explanation could be that most Fijians and Solomon Islanders only live in towns for economic reasons and not social reasons. The majority of ethnic Fijians and Solomon Islanders will go back to their home village for retirement. In the village setting the usage of traditional technology is cheap, costs no money and is readily available because it uses the environment.

This study showed that the majority of educators of both Fiji (77.5%) and the Solomon Islands (90%) still viewed traditional technology as useful and beneficial today. A comparison was also made between educators and students and both agreed that traditional technology is still very useful today in both Fiji and the Solomon Islands (See Appendix F (5) for comparison summary of educators' perceptions and students' perceptions of traditional technology). This new information from educators' perceptions on traditional technology from both Fiji and the Solomon Island is a new contribution to existing knowledge about technology.

- **Summary**

The discussion of educators' perceptions covered technical education, technology, technology education and traditional technology of both Fiji and the Solomon Islands This discussion highlighted several important points as follows: (a) educators' perceive technical education curriculum as out-of-date and needing revision, (b) educators' perceptions of technology varied, as artefacts, latest or modern which make work easier, (c) educators' perceptions on technology education as the teaching of technology subjects, as base education which is useful for life and is the application of theoretical knowledge, and (d) educators' perceptions of technology as preservation of culture and identity, and is still very useful today. This discussion will also form the base for the recommendations outlined in section 10.10. A comparison summary of educators' perceptions and students' perceptions on technical education, technology, technology education and traditional technology is provide in Appendix F (1), Appendix F (2), Appendix F (3), Appendix F (4), and Appendix F (5). The next section will focus on whether the existing technical education curriculum is meeting the needs and aspirations of students and educators in Fiji and the Solomon Islands.

10.4 HOW CAN THE FINDINGS OF THIS RESEARCH INFORM THE CURRICULUM DEVELOPMENT PROCESS IN THE SOUTH PACIFIC?

The findings of this research can inform people about the curriculum development process in the South Pacific in the following ways:

- **Provide a base, a guideline of a framework for the curriculum development process**

This research on students' perceptions and educators' perceptions in both Fiji and the Solomon Islands provided a base and a guideline for the development of a framework for the curriculum development process (See Chapter 1, p.6). This research has established a base from which the new technology education curriculum could begin.

It also provided vital background information for the establishment of a new technology education curriculum (Jones & Carr, 1993). This was the first research to be conducted for the purpose of establishing a technology education curriculum for the South Pacific region (Refer 10.6).

- **Provide an avenue for students and teachers to voice perceptions and influence the curriculum development process**

Both students and educators are important groups of people in the curriculum development process because they influence the nature, type, depth and direction of curriculum development (Jones & Carr, 1993). This study provided students the opportunity to voice their views on the existing technical education curriculum and the possible future technical education curriculum (See Chapter 1, p7). It provided educators with the opportunity to voice and express their disappointments and aspirations concerning the existing technical education curriculum and the direction to be taken in the future (See Chapter 1, p7).

- **Provide information on students' subject choice, students' career choice, subject streaming and subject gender biased**

This study has highlighted the issues concerning students' subject choice, students' career choice, subject streaming and subject gender biased. An understanding of these issues could give teachers, curriculum developers and educators a better guide to plan curriculum development process. These issues could be a hindrance to learning therefore providing this information can help give direction on how to plan strategies for curriculum development. This study also shows that career choice influenced subject choice and subject streaming and subject gender biased hinders students progress. By knowing these issues and by identifying what hinders students' learning, a better approach to curriculum development could be adopted to solve or minimize the problems often faced by students in high schools in Fiji, the Solomon Island and the South Pacific.

The three points discussed above provide some direction on how this research can inform people about the curriculum development process in the South Pacific.

10.5 CONCLUSIONS

The conclusion will be divided into two parts as follows: (a) conclusions about students, (b) conclusions about educators.

- **Conclusions for students' perceptions**

Students' conclusions were drawn from chapter 6 (Fiji) and Chapter 8 (Solomon Islands).

Students' subject choice and students' reasons for subject choice

Students' subject choices were very much influenced by their career choices, which were also influenced by subject streaming and subject gender bias. Students' showed an interest in technical subjects but were also influenced by their future career choice. Students' perceived subject choice as being useful to their future careers. The majority of students made their own decisions regarding their future careers and most showed an interest in studying other subjects. A significant conclusion is that subject choice is influenced by career choice and this is further influenced by subject streaming and subject gender biased.

Existing technical education

Students perceived the existing technical education curriculum as useful but its content could be made more relevant. Students also thought that there was room to improve the standard by revising the content and structure of the existing technical education curriculum in order to keep up with the development of technology worldwide. According to students' perceptions the existing technical education curriculum is out-of-date and needs complete revision to prepare citizens for the 21st century.

Technology

Students' perceptions of technology varied, such as artefacts (machines etc), applications, recent phenomenon (modern, latest etc) and problem-solving. Examples of technology were classified as artefacts (machines etc) and process. The reasons for the choice of technology were improved efficiency, modern and their ability to do work. Reasons for liking technological things were again due to improved efficiency, making life easier and creating comfort. Students liked to learn all kinds of technology but preferred computing. Students were also interested in all kinds of technology at school but again preferred computing. Interpretation of the phrase 'doing technology' varied but was divided into five broad categories: broadening knowledge, practical application, learning process and preparation for future.

Traditional technology

The majority of students (in Fiji 77% and in the Solomon Islands 95%) were aware of the existence of traditional technology in their own culture. Examples of traditional technology were listed in Chapter 6, Table 6.19, p. 142 (Fiji), Chapter 8, Table 8.19, p. 193 (Solomon Islands) and for indigenous technology refer to Appendix A, Table 4, p. 267. Reasons for learning traditional technology were listed as maintaining cultural identity, survival and preservation of cultural heritage and being beneficial. The majority of students (in Fiji 92% and in the Solomon Islands 87.5 %) believed that traditional technology is still very useful today.

- **Conclusions about educators' perceptions**

The following were the conclusions made from the findings of educators perceptions as analysed in Chapter 7 (Fiji) and Chapter 9 (Solomon Islands).

Existing technical education

Educators believed that the existing technical education curriculum needs revision and up-grading. This implies that the existing technical education curriculum is out-of-date. The purpose of the existing technical education curriculum was to provide basic, practical education, knowledge empowerment, sustainable knowledge, classroom subject and preparation for life. Technical education lacks support from authorities and the school system. As a school subject technical education was relevant but subject contents were out-of-date. Educators from Fiji said that the existing technical education curriculum was popular while educators from the Solomon Islands said it was not. Educators agreed that they would like to gain further knowledge in other subjects (for example maths, physics etc) to help them teach technical subjects. All educators agreed that there are weaknesses in the existing technical education curriculum for example, lacking resources and funding, lacking qualified teachers, out-dated curriculum, lacking support from education authorities, etc. All educators agreed that the existing technical curriculum needs support and revision.

Technology

According to educators, technology was perceived as a subject for problem-solving using the latest machines/technology because of improved efficiency. Educators said that students would be 'interested' in learning other things at school but would prefer computing to other subjects.

Technology education

Educators perceived technology education as the following: the education of technology, practical application, and improved efficiency. Educators' perceptions of technology education varied for example: cultural heritage, living technology, arts and crafts, and introduced skills.

Traditional technology

Educators believe that traditional technology is still very useful today as it is being practiced and is very much a part of the every-day life. Rural people depend on traditional technology to fulfil daily activities.

The next section discusses the implications of this research.

10.6 IMPLICATIONS OF THIS RESEARCH FOR THE DEVELOPMENT OF TECHNOLOGY EDUCATION IN THE SOUTH PACIFIC

Implications are the likely outcomes from the research, the possible impact or the generation of events due to this research or as a result of the findings of this research. The implications for this research will focus on the South Pacific and what these research implications mean to Fiji, the Solomon Islands and the South Pacific. The implications for this research are as follows:

- **Students' perceptions influence learning in technology**

Understanding what students think is crucial in the learning process therefore the findings of this research are important. This is because students' contribution to the learning process is the key to developing better teaching and learning strategies. Students' knowledge of technology and understanding concept of technology can often influence and impact students' capabilities in undertaking technological activities which are associated with teaching strategies influence (Jones & Carr, 1993;

Jones et al, 1995; Mather, 1995). Therefore finding out students' perceptions of technology is important. On the other hand if students have limited knowledge and understanding of technology then it could be assumed that this will limit students' learning of technological concept, practice and process. It is therefore paramount that when developing a technology education curriculum student's technological concept, practice and process needs be taken into account. Finding out the students' perceptions of Fiji and the Solomon Islands is therefore critical and important in developing a better teaching and learning strategy based on this notion. Furthermore the findings of this study on students' perceptions will enhance the development of a more relevant technology education curriculum for the South Pacific. In this respect the research work has also provided a basis for this development.

- **Educators' perceptions influence curriculum development process**

The previous discussion emphasis the vital role students' perceptions play in developing better learning and teaching strategies. The same is also true of educators' concepts and understanding of technology and technology education both in terms of curriculum development and implementation in the classroom therefore this research is important. Educators (teachers) are important elements in the educational process because they also influence learning, teaching and development of the curriculum process. Therefore obtaining educators' perceptions of Fiji and the Solomon Islands in this context is important in the development of learning, teaching and the development of a technology education curriculum in the South Pacific.

According to Goodson (1995) teaching and learning of technology at school is often bound up with the initiation and the socialisation of teachers into subject subcultural setting. These subcultures (subjects), according to Paechter (1991), represent the consistent views of the role of teachers, the nature of their subjects, the way it should be taught and expectations of the students' learning. Teachers' past experience are also an important aspect in formulating a new curriculum as stated by Lindblad (1990) of Sweden. Furthermore secondary school subject subcultures were a strong influence on teachers' concepts of technology and subsequent classroom practices (Jones & Carr, 1992; Jones & Compton, 1998b). With this information from past research on teachers (educators) influence in the development of technology education curriculum Fiji, the Solomon Islands and the South Pacific countries stand to gain.

- **Teachers' professional development**

The professional development of teachers (educators) is an important aspect of the education process to improve and maintain teaching standards. One aspect of this research was to identify educators' perceptions of technical education, technology, technology education and traditional technology and to give a better understanding of these four areas. Prior to this, there were no studies conducted on technology but by conducting this research and documenting the findings it adds to the knowledge of technology and technology education in the South Pacific. As a further result of this research, educators of Fiji and the Solomon Islands will also be made aware of international trends in technology education. All this new information on technology broaden teachers' knowledge and contributes towards technological literacy in Fiji, the Solomon Islands and the South Pacific. By having a better knowledge and a good understanding of technology and technology education, teachers will be better equipped to implement the technology education curriculum into the classroom system.

- **An opportunity for the introduction of traditional technology into the school curriculum**

Another implication for this research would be the introduction of traditional technology into the school curriculum. Traditional technology has never been part of the formal school curriculum but the findings of this research recommended that it should become part of the school curriculum. One reason given was that it is an important part of the daily lifestyle for people so it should be included (Chapter 6: Section 6.5, Table 6.27; Chapter 7: Section 7.5, Table 7.40; Chapter 8: Section 8.5, Table 8.61 and; Chapter 9: Section 9.5, Table 9.74). Another reason was that it would form the base for the introduction of a technology education curriculum. Using this approach, all students would have the opportunity to learn both traditional education and western technology education which therefore gives students an understanding of both educational systems. The suggestions made by students and educators in this research that traditional technology be a part of the high school system, also meant that their identity and cultural heritage would be preserved.

The above highlighted the implications for this study. The next section will list the recommendations.

10.7 RECOMMENDATIONS

Based on the findings of this research the following recommendations were made. These recommendations are broad statements made by students and educators of both Fiji and the Solomon Islands. They concern the existing technical education curriculum (See Chapter 6, 7, 8 and Chapter 9) and suggestions concerning a technology education model curriculum (See Chapter 7, pp. 160-162; Chapter 9, pp. 212-213 & Appendix H for a proposed structure of education system in the South Pacific beyond 2000 supporting the introduction of technology education curriculum). The recommendations are as follows:

- **Recommendation 1**

That the weaknesses of the existing technical education curriculum have been highlighted and the suggestions that have been made by educators of both Fiji and the Solomon Islands to improve the existing technical education curriculum, be considered by the relevant authorities.

- **Recommendation 2**

That the existing technical education curriculum in high schools be revised and a new technology curriculum be developed.

- **Recommendation 3**

That the new technology curriculum be called 'technology education' and that it be broad-based, appropriate, relevant and its' objective is to achieve technological literacy for all citizens of Fiji, the Solomon Islands and the South Pacific.

- **Recommendation 4**

That consideration be given to local culture and indigenous technology when developing the broad-based technology education curriculum. The knowledge of indigenous technology will form the base and platform from where the broad-base technology education will be built.

- **Recommendation 5**

That the new technology education curriculum be fully supported by the various education authorities and financially supported. Furthermore for the technology education curriculum to work it needs a good reliable logistical support mechanism such as an introduction of support areas (technical management, communication tools), a pool of expert resources, and a mobile technology education unit etc.

- **Recommendation 6**

That the new technology education curriculum be provided with resources such as facilities, materials, equipment, tools, good students and qualified teachers.

- **Recommendation 7**

That the issue of streaming and gendering of subjects as highlighted by students and educators be resolved. This means that the division of academic and technical be scrapped.

- **Recommendation 8**

That further research be conducted on technical education, technology, technology education and traditional technology in the South Pacific.

- **Recommendation 9**

That the curriculum development process in the South Pacific will continue to be a constant consultation process between students, educators and the curriculum development institutions.

- **Recommendation 10**

That the recommendations made in this thesis be accepted and acted upon.

The next section will discuss the suggestions for further research.

10.8 SUGGESTIONS FOR FURTHER RESEARCH

This is the first research study to be conducted in Fiji and the Solomon Islands on students' and educators' perceptions of technical education, technology, technology education and traditional technology. No research work has been conducted in this area in the past so this is the most significant research work conducted towards developing a technology education curriculum for the South Pacific. The information gathered from this research could be used as a base for further research to develop technology and other related areas in the South Pacific. In this way it could enhance the further understanding of technology in the South Pacific Islands. However, there are a lot more areas in technology, technology education and indigenous technology in the South Pacific which need to be addressed through further research. Other areas in technology education in the South Pacific which need further research include: technological literacy, methods, practice, capability, process and, assessment. Another area of research which needs to be addressed through further research is the type of materials required and their suitability to the South Pacific. Research could look at the types, variety and depth of these materials. Writing skills in technological subjects could be the result of this research. The domino effect in all technological areas could be the approach. The South Pacific is a rich untapped region which is ready to be explored. The above highlights the importance of further research in the South Pacific. The next section will be the concluding comments.

10.9 CONCLUDING COMMENTS

These concluding comments will be on the purpose, research findings, conclusions and the implications of this research.

The purpose for considering interviewing students and educators for their perceptions was to establish a base, a guideline and a framework for the curriculum development process in the South Pacific. What this means is that by using students' and educators' perceptions, an understanding can be obtained of the kind of technology education curriculum people in Fiji and the Solomon Islands need for their citizens.

This research showed students' and educators' perceptions of technology of Fiji and the Solomon Islands varied. They viewed the existing technical education curriculum as obsolete, irrelevant and it does not meet their aspirations and needs. They further viewed the existing technical education as needing revision and suggested a broad based technology education curriculum. The four implications of this research relate to (a) students' perceptions influence learning, (b) educators' perceptions influence curriculum development process, (c) educators' professional development, and (d) the introduction of traditional technology into the school education system are as follows:

- Students' perceptions are important for this research because by understanding what view students have on technology will help teachers plan and develop a better strategy for teaching and learning of technology in the classroom (Jones, 1997b). This research work on students' perceptions of Fiji and the Solomon Islands was conducted based on this notion.

- Educators' (teachers) perceptions were also important for this research because teachers' influence (Jones, 1997b) the direction of curriculum development due to their past experience in the classroom and their beliefs in subject areas (Lindlad, 1990). With better understanding of technology wise decisions can be made in the development of the technology education curriculum process in the South Pacific education system.

- Teachers professional development is paramount therefore the findings of this research could contribute to a better understanding of technology in the South Pacific. This new knowledge of technology could help teachers to plan better teaching strategies due to a better understanding of technology. Teachers can also be more confident in teaching technology education curriculum.

- Traditional technology is a very important part of the Fijian way of life (Vakaviti) and the Solomon Island way of life (kastom/kino). If traditional technology is important then (according to students and educators of Fiji and the Solomon Islands in this research) it needs to be introduced into the school system forming the base knowledge for technology education.

This research study is significant to both Fiji and the Solomon Islands because the implications (as outlined above) from the findings will be far-reaching culturally, socially, economically, educationally, spiritually and politically. It is timely and relevant for Fiji, the Solomon Islands and the South Pacific Islands Countries in the 21st century.

APPENDICES

Appendix A	_	**Fiji and the Solomon Islands (A Summary).** **(Chapter 2, p22 & p35).** Table 1: The Country. Table 2: The Education System. Table 3: The Existing Technical Education Curriculum. Table 4: Indigenous Technology.
Appendix B	_	**Evolution and International Trends in Technology Education: Table 5. (Chapter 3, p56).**
Appendix C	-	**BEd (Technology) Degree Programme, USP, Fiji. (Chapter 3, p64).**
Appendix D	_	**Curriculum Decision-Makers Chart: Influencing Agencies in the Solomon Islands (Chapter 4, p91).**
Appendix E	_	**Interview Questions (Chapter 5, p104).** Appendix E (1): Students' Interview Questions. Appendix E (2): Educators' Interview Questions.

Appendix F – **Summary of Research Findings** **(Chapter 5, p.113).**

Appendix F (1): Summary of Students' Perceptions.

Appendix F (2): Summary of Educators' Perceptions.

Appendix F (3): Comparison of Fiji Students' Perceptions versus Fiji Educators' Perceptions.

Appendix F (4): Comparison of Solomon Islands Students' Perceptions versus Solomon Islands Educators' Perceptions.

Appendix F (5): Overall Comparison: Students versus Educators.

Appendix G – **Consent Letters to Conduct Field Research Work** **(Chapter 5, p.101).**

Appendix G (1): Letter to Fiji Education Authority.

Appendix G (2): Letter of Approval from Fiji.

Appendix G (3): Letter to Solomon Islands Education Authority.

Appendix G (4): Research Permit of Approval from the Solomon Islands.

Appendix H - **A Proposed Structure for an Education System in the South Pacific Island Countries 2000 beyond supporting the introduction of Technology Education Curriculum** **(Chapter 10, p. 257).**

APPENDIX A

Table 1: The Country.

Table 2: The Education System.

Table 3: The Existing Technical Education Curriculum.

Table 4: Indigenous Technology

Comparison Tables

This section presented four summary tables making a comparison of Fiji and the Solomon Islands. Comparison tables covered: the country, the education system, the existing technical education curriculum and indigenous technology.

Table 1: The Country

There were many similarities. Both countries are found in the tropics and their indigenous people are from the Melanesian ethnic group. They shared a common colonial history and are both multi-cultural societies. They adopted a democratic parliamentary system of government and shared many unique South Pacific problems.

Description	Fiji Islands	Solomon Islands
Geography	Archipelago, 320 islands, 1/3 inhabited, volcanic, thick rainforest, fringed reefs, Cyclone season (Nov-April) .	Archipelago, 992 islands, 347 inhabitant, rugged, mountainous, heavily wooded, Cyclone seasons (Jan-May).
Location	South Pacific, Tropic of Capricon	South Pacific, Tropic of Capricon
History	Legend say from Africa. Evidence of Lapita people, Tongan influence, Abel Tasman (first European).	From South-East Asia (60,000 years ago). Evidence of Lapita people. Alvaro de Mendana (first European)
People	Taukei (48%), Indo-Fijian (52%), Kailoma (part-Europeans), Kaivalagi (Europeans), Fiji Islanders. Population 800,000.	Melanesians 380,000 (95%), Polynesians 15,000 (4%), Micronesians 4, 500 (2%), Asians & Resident Expatriates. Population 400,000.
Culture	Chiefly system (Ratu/Adi/Ro). Multi-racial, multi-cultural, pluralistic, heterogenous society.	Wontok & Bigman System, (Egalitarianism), multi-ethnic, & multi-cultural, Practice both Patrilineal & Matrilineal.
Language	Bauan (Vosa Vakabau), 300 dialects, Hindi (Urdu Pacific version), English	Pijin Iglis & English, 70 languages and 30 dialects.
Religion	Christian, Muslim, Hindu, Sikhs, Indigenous religion	Indigenous, Christians, Bahai, Oriental & Asian religions
Government	Great Council of Chief, Parliamentary Democracy System with PM, Cabinet, Lower House & Upper House)	Parliamentary Democracy System with PM, Cabinet & elected member of parliament. Provincial government.
Economy	Main export: tourism & sugar main export. Also export: molasses, gold, timber, fish, copra & clothing.	Main export: timber (49%), fish (25%), palm oil (13%), copra (6%), cocoa (2%)
Workforce	275,000 (33% self employed while 36% formal paid employment)	43,200 full-time or part-time employment (1995)
General Problems	Unequal distribution of development, neglect of rural areas, scattered islands, unemployment	Scattered islands, isolated rural areas, break-down of social structure, urban drift, unemployment.

Table 2: The Education System.
A comparison of the education systems of Fiji and the Solomon Islands.

The Education System of both Fiji and the Solomon Islands were influenced by various churches. Colonial government did little until after the Second World War. Education systems are academically oriented and are not free but compulsory. The education systems are streamed and gendered. It produces elite class citizens.

Description	Fiji Islands	Solomon Islands
Traditional Education	"Vakaviti" Fijian Way of Life. Education determined by rank in hierarchy. Pass down method.	"Kino" participatory education. Education for survival of culture. Pass down method.
Church Education	Main Influences: Methodists and Catholic main influence. Other churches also established schools (Anglican, SDA, Assemblies, Gospel, Mormon)	Main Influences: 5 main churches: Catholic, Anglican, Methodists, SSEC & SDA. They own & operate 5 high schools
Colonial Education	Not interested in educating natives. Started in 1874 under Government Ordinance (1916), QVS (1906) & RKS (1955) established. Arya Samaj & Muslim League also featured.	Not interested in educating natives. Left to the missions. The 1957-1958 Education Policy acknowledged a passive role. The 1962 EP recognized 'rights of every child to education' & formalized a system calling it 'Comprehensive'. The 1967 EP report on progress made.
Post Independence Education	Royal Commission (1970) recommend change from (8:4) to (6:4:2) system. Development Plan VI-IX from 1971-1990 came out of RC. Education Act (1978). Education Fiji 2020 (1998) & Education Commission 2000 (1999) were important development.	The 1975-1979 EP aimed to establish 20 PSS . By 1975, 12 PSS established. By 1982 PSS students could sit Form 3 examinations. The 5 NSS upgraded to Forms 5 & 6. CHS established. RTC offered technical courses for school-leavers. SICHE established 8 schools offering degrees & Diploma.
Formal Education	Established under 1916 Education Ordinance & 1969 Royal Commission. Primary (Classes 1-6) Junior Secondary (Forms 1-4) & Senior Secondary (Forms 5, 6 & 7).	Second Education Policy Paper (1962), 'Education for What?' (1973) & 1989 'Education for Who?' helped 'formalized' schooling & education system. Called 'Comprehensive Education System' which states that all children have equal excess to education. Kindergarten (ages 3-5); Preparatory (age 6); Primary: Std 1-6 (ages7-12); Secondary: Forms 1-7 (ages 13-17) Tertiary (18 onwards)

Table 3: The Existing Technical Education Curriculum

A comparison of the existing technical education curriculum of Fiji and the Solomon Islands.

Characteristics of the technical education curriculum includes its' lack of popularity, lack of support, obsolete curriculum, lack of resources, lack of facilities, lack of funding and that it operates in isolation.

Description	Fiji Islands	Solomon Islands
Definition	Known by several names: 'Craft Education, Multi-Craft, Industrial Education, Technical Education & Vocational Education. Official title: 'Technical & Vocational Education and Training (TVET).' Subjects includes: Agricultural Science, Computer Education, Engineering Technology, Home Economics, Industrial Arts, Introduction to Technology, Secretarial Studies & Woodwork.	Subjects include: Industrial Arts, Design & Technology, Home Economics, Agricultural Studies, Business Studies and Vocational Education. Vocational School subjects includes: Carpentry, Building, Joinery, Home Economics & Motor Mechanics.
Curriculum	Separate syllabus & known as 'Optional'	Separate syllabus. Known as 'elective' by school system.
Attitude	Not important & not financially rewarding. Prejudice exists. Lack of support. Facilities obsolete. Avoided by students & parents.	Negative. Marginalized. Prejudices exist. Students avoid technical education.
Subject Streaming	School and subjects divided based on gender. Students referred to as either 'academic or 'technical'.	Streamed & Gendered. Encouraged streaming by: kastom, mission schools, colonial administration & existing school system
Facilities	Include: buildings, classroom, laboratory, equipment, tools, machinery, materials & implements. Either obsolete or not working	Neglected. old, needs maintenance. Technical buildings amongst the most dilapitated.
Funding	Limited. Schools & Teachers left to look for funds.	Big problem. Teachers & schools left to raise funds.
Job Opportunity	Limited. High competition unless in very specialized area.	No job guarentee for graduates. There is job scarcity.
White-collar Job Syndrome	Office work, doctors etc (brain v hands). Ultimate dream of parents. Colonial legacy. Fiji perpetuate WCJS.	Ultimate dream of parents for children. No job thus unemployment is the result.
Scholarship & Training	Limited. Not given a chance to develop for decades!	Limited. Numerous vacancies in school system for technical teachers.
Ministry of Education Support	Very supportive. 'Technology' title & provide office for technical education.	Very supportive but contrained by resources.

Table 4: Indigenous Technology

A comparison of the indigenous technologies of Fiji and the Solomon Islands

The term 'indigenous' is preferred to 'traditional' because the former reflects or brings out the local flavour. Indigenous technology is based on man and nature. It is informal and relevant to day-to-day living. It is participatory learning by watching, observing and taking part in what parents are doing. Indigenous technology is centred on tool-making; food gathering; gardening; fishing; hunting and; putting all these daily practices to use.

Description	Fiji Islands	Solomon Islands
Definition	Fijian knowledge, skills, methods, tools & practices developed by ancestors while interacting with environment	Solomon Islanders involved in activities & chores. Live skills for survival. Developed by ancestors.
Nature	Old, ancient, simple, primitive, puzzling, scientific & belonging to the ancestors. Survival kit. Learn by participating & not in-born	Old, ancient, tradition, established, sacred, 'taboo', practical, tangible, functional, non-transferable & belonging to ancestors
Value & Respect	Highly valued & respected.	Highly valued & respected.
Category	1. Those related to land (Qele), 2. Those related to the sea and fresh water (Waitu & Uciwai), 3. Those related to the sky (Lomalagi).	1. Those related to land (Puava), 2. Those related to the sea and fresh water (Karaka & Idere), 3. Those related to the sky (Veluvelubangara).
Indigenous Living Technology	Fijian Way of Life (VAKAVITI) Indigenous Technologies: 1. Gathering (I walewale ni Soqoni) 2. Farming (I walewale ni Teitei) 3. Sailing (I walewale ni Soko) 4. Fishing (I walewale ni Siwa) 5. Digging (I walewale ni Kelikeli) 6. Catching (I walewale ni Ciqo) 7. Climbing (I walewale ni Kaba) 8. Burning (I walewale ni va-kamakama) 9. Cooking (I walewale ni Vakasaqa) 10. Storage and Preservation (I walewale ni Mamaroroi) 11. Warfare (I walewale ni Valu) 12. Hunting (I walewale ni Vakasasa)	Solomon Islands Way of Life (KINO) Indigenous Technologies: 1. Gathering (Ene Chero) 2. Hunting (Ene Chie) 3. Farming (Tavete Chigo) 4. Fishing (Chaba Ihana) 5. Building (Tave tavete) 6. Making (Tavete tingitonga) 7. Weaving & Platting (Pidiki) 8. Playing (Melomelongo)

APPENDIX B

Table 5: Evolution and International Trends in Technology Education

(A summary of advocators, technology traditions and existing technology programs worldwide)

Advocators of technology education curriculum	**Historical technology tradition & model practice**	**Current & proposed technology education program**
<u>**United Kingdom**</u> • Robert McCormick (1992) • David Layton (1995) • Richard Kimble (1994)	Craft, Design & Art ⇒ Craft, Design & Technology (CDT) (England); Craft, Science & Engineering (Scotland); Craft, Manual, Science & Art (Northern Ireland); Technical and Vocational Education Initiative (TVEI)	Craft, Design & Technology; Design & Technology
<u>**United States of America**</u> • William Dugger (1988) • Michael Hacker & Robert Barden (1987) • Neil Swernosky (1987) • Michael Dyrenfurth (1994) • Robert McCormick (1992) • Theodore Lewis (1991, 1994, 1995 & 1996) • Karen F Zuga (1997)	Societal Needs + Russian System ⇒ Manual Training + Sloyd ⇒ Manual Arts + Industrialization ⇒ Industrial Arts + Technological Press ⇒ Industrial Technology Education + Social Consciousness + Science/Technology/Society Education ⇒ Technology Education.	Technology Education at various levels; Technology Education Programme an elective; <u>Programmes</u> Educating Americans for the 21^{st} century; Project 2061 (AAAS, 1989); International Technology Education Association (ITEA).
<u>**Central & Eastern Europe**</u> **(Russia & Siberia)** • Dietrich Blandow & Frantisek Mosna (1994)	Manual training Polytechnical Education (Polytechnical Instruction). Based on 'Learning, Working & Sports'	General Education in Polytechnic Institutions
<u>**Western Europe**</u> **(Belgium, Germany, France & Netherlands)** • Marc J. de Vries (1992 & 1994)	Variety of Technology Program Approaches ('the world in a nutshell'); Craft, Manual , Science (Netherlands); Craft & Industrial Production (Germany); Craft (France)	Technology Education (Netherlands)

Advocators of technology education curriculum	Historical technology tradition & model practice	Current & proposed technology education program
<u>**Nordic Countries**</u> **(Finland, Sweden, Norway, Netherlands & Iceland)** • Tapani Kanaoja (1994). • Uno Cygnaeus (Finland). • Otto Saomon (Sweden). • Allingbjerg (Denmark). • Bull-Hansen (cited in Lysne, 1967)	Design associated with Sloyd (Art) Movement + Design & Craft (Finland); Teknik + School & Craft + Child & Technology (Sweden); Forming (Norway); Danish Craft Education + Danish Sloydteacher (Denmark)	Technical Work + Technology Education (Finland); Sloyd (Optional) + Teknik (Compulsory) (Sweden) Sloyd + Technology Education (Denmark) Technology Education (Norway); Picture & Hand (Form & Mynd-og hanment) (Iceland)
<u>**Africa**</u> **(Botswana, Ethiopia, Ghana, Kenya, Nigeria, Tanzania, Zambia & Malawi, Zimbabwe)** • G. O. Collison & N. Aidoo-Taylor (1990). • A. I. Akubue & E. C. Pytlik (1990). • D. Ajeyalemi & T. D. Balyelo (1990). • R. A. Hodzi & S. M. Chagwedera (1990). • B Wanjala Kerre (1990, 1992). • Michael Robson (1992). • Beverly Young (1992). • Ankiewicz (1994).	Technical drawing, metalwork & woodwork (Ghana). Industrial Arts (Nigeria). Training in manual & technical skills and carrying the baggage of a low status and esteem (Nigeria). Technical education (in primary agriculture and in secondary school wood and metal (Zimbabwe).	Introtech + Introduction to Technology + Technology Education (Nigeria); Technocentres + Technical & Vocational Education (Zimbabwe); Local Technology (Malawi); Vocational Training + Design & Technology (Botswana); Technology Education (South Africa); Polytechnical education (Productive Technology) at primary + Education & Training (Skills) + Specialisation at secondary (Ethiopia); Arts & Crafts + Home Science + Agriculture + Business Studies in primary & Technical Education + Technology Education (Kenya); Technical & Scientific Education (Tanzania); Vocational Education + Production Work (Zambia)

Advocators of technology education curriculum	Historical technology tradition & model practice	Current & proposed technology education program
<u>Latin America</u> **(Colombia, Mexico, Cuba & Venezuela)** • Edgar A Andrade Londono (1992)	1980s the 'lost decades' Vocational Education & Training (VET)	A widespread interpretation that Technology Education as an updated and higher echelon version of technical education. Technical & Technological Modalities (Colombia); New Technologies (Mexico); Technology Education (Cuba)
<u>South-East Asia</u> **(Malaysia, Brunei , Taiwan, Darussalam, Singapore & Hong Kong)** • Kevin Morgan (1992) • K K Wan (HK, 2000) • Richard Kimble (1997) • David Lee (Taiwan)	Craft, High Technology, woodwork, metalwork, home economics, etc Two streams ⇒ Educational & Vocational (Taiwan)	Technology education curriculum proposed (Hong Kong). From Industrial Arts to 'Living Technology' (Taiwan)
<u>Australia</u> • Kevin Morgan (1992) • John Williams • Richard Kimble (1997)	Craft, Manual Training, Industrial Arts (WW, MW), Home Craft & T/D	Design & Technology (NSW); NSW Technology Program emphasis is on School; Western Australia Technology Program emphasis is on Community; Each State practice own technology curriculum within framework of 'Hobart Declaration' in Australian National Curriculum
<u>New Zealand</u> • Alister Jones (1995, 1999) • Mike Forret • Judy Moreland	Craft, Manual Training, Industrial Arts, T/D, Home Economics, Technicraft	Technology Education

APPENDIX C

Bachelor of Education Degree Programme

BEd (Technology) Double Major

(As from November 2001)

	First Semester	Second Semester
First Year:	TE 102 (T)	TE 158 (T)
(100 Level)	TE 158 (T)	TE 106 (T)
	ED 153 (E)	ED 151 (E)
	LL114 (C)	CS102 (S)
	MA102 (S)	
Second Year:	TE233 (T)	TE252 (T)
(200 Level)	ED250 (E)	TE256 (T)
	ED253 (E)	ED252 (E)
Third Year:	TE353 (T)	TE350 (T)
(300 Level)	ED354 (E)	ED350 (E)
		ED353 (E)

Course Break-down

TE102	Engineering Drawing (Technology)
MA102	Basic Mathematics (Service)
CS102	Computing for Science & Technology (Service)
TE106	Engineering Materials & Mechanics (Technology)
LL114	English or Academic Purposes (Compulsory)
ED151	Human Development (Education)
ED153	Education and Society (Education)
TE158	General Technics (Technology)
TE233	Manufacturing Processes (Technology)
ED250	Technology Curriculum I (Education)
TE252	Construction Technology (Technology)
TE256	Workshop Practice (Technology)
ED252	Educational Psychology and the Teaching & Learning Process (Education)
ED253	Theories and Ideas in Education (Education)
TE350	Research Project (Technology)
ED350	Technology Curriculum Studies II (Education)
TE353	Creative Design (Technology)
ED353	Contemporary Issues in Pacific Island Countries (Education)
ED354	Education Measurement and Evaluation (Education)
1 x 300	Level (Elective)

Details of the BEd (Technology) Degree Programme

- 8 Technology + 8 Education + 2 Service + 1 Compulsory + 1 Electives = 20 courses.
- It is recommended that potential students must pass TEFO3 or equivalent prior to enrolling in TE106 as this is the prerequisite for TE106.
- Electives (200 level and 300 level) can be chosen either from SOH, SSED or SPAS and must be approved by both Head of Technology and Head of School of Humanities.
- SOH = School of Humanities.
- SSED = School of Social Economics and Development.
- SPAS = School of Applied Sciences.

APPENDIX D

Curriculum decision-makers and curriculum influencing agencies for curriculum change in the Solomon Islands: Major Players and Organizations.

(Source: Concept adopted from C. J. Marsh, Producing a National Curriculum: Plans and Paranoia, Allen & Unwin, Sydney, 1994. p31).

Categories of Decision-Making Agencies	**Perceived Influence on Curriculum Development (Scale Range: High - Low)**
Parliament	Medium
Ministry of Education & Human Resources Development	High
Permanent Secretary	High
Curriculum Development Unit (CDU)	High
Urban Community	Medium
Rural Community	Low
Teachers Union/Association	Medium (50/50 decision. Depends on issue)
Administrators	High
Students	Nil. (Not Considered)
School Committee	Medium
School Board	Medium
Review Consultants	Medium (50/50 decision. It depends on government)
Non-Government Organisations (NGO)	Medium

APPENDIX E (1)

STUDENTS' INTERVIEW QUESTIONS

(Fiji students & Solomon Islands students)

A Perception of subject choice and students' reasons for Subject Choice.

- What subjects are you taking this year?
- Why are you taking those subjects?
- What is your proposed future career?
- Is the course preparing you for your future career job?
- How useful is the course to your future career?
- Who made the decision for you to take this course?
- What are some 'other things' you would like to learn in school?

B Perception of the existing technical education curriculum.

- How does the existing technical subject compare with other school subjects?
- How interested are you in the existing technical education subject in high school?
- Is the existing technical curriculum relevant to the needs of the country?

C Perception of technology.

- What does technology mean to you?
- What are some examples of things you see as technology?
- Why do you choose them as technology?
- What do you like about technological things?
- What kind of technology would students be interested in doing at school?
- What does 'doing technology' mean to you?

D Perception of traditional technology (indigenous technology).

- Do you have traditional technology in your culture?
- What are some examples of traditional technology?
- Why do you have to learn traditional technology?
- Is traditional technology still useful in your society today?

APPENDIX E (2)

EDUCATORS' INTERVIEW QUESTIONS.

(Fiji educators & Solomon Islands educators).

A. Perception of the existing technical education curriculum.

- What do you think of the existing technical curriculum in the high school?
- What is the purpose of the existing technical education curriculum?
- How does the technical curriculum compare with other school curriculum?
- Is the technical curriculum relevant to the needs of the country?
- What is the level of student interest in the existing technical curriculum?
- What other areas would you like to learn to help better prepare you to teach technical subjects?
- What are the weaknesses of the technical curriculum?
- How can the technical curriculum be improved and what would be your suggestions?

B. Perception of technology.

- What does technology mean to you?
- What kind of technology would students be interested in doing in school?

C. Perceptions of technology education.

- What does technology education mean to you?

D. Perceptions of traditional technology.

- Do you have traditional technology in your culture?
- Is traditional technology still useful in your society today?

APPENDIX F (1)

Comparison Summary of Students' Perceptions.

(A comparison between Fiji students perceptions and Solomon Islands students' perceptions)

Students' Perceptions (Fiji).	Students' Perceptions (Solomon Islands).
Subject Choice and Student Reasons for Subject Choice (Chapter 6, pp. 124-130).	**Subject Choice and Student Reasons for Subject Choice (Chapter 8, pp. 174-181).**
• Majority of students interviewed preferred academic subjects as their first choice. For example, 100% for English & 92% for Maths.	• Students interviewed preferred academic subjects for their first choice. For example 100% for English & 60% for Maths.
• Majority of students (92%) said reasons for subject choice was future career.	• Reasons for subject choices include: a requirement (67.5%), interest and enjoyment (12.5%), future career (10%), provide background knowledge (10%).
• Career choices included: engineering (45%), medicine (22%), service industry (13%), teaching (12%) and building/ architect (8%).	• Career choice includes: Building industry and engineering (25%), teaching (20%), business (20%), medicine (17.5%), food technology (7.5%), agronomist (5%), others (5%).
• Majority of students (92%) agreed subject choice prepares them for future careers.	• Most students (70%) agreed that subject choice prepares them for a future career while 17.5% said no and 12.5% said to an extent.
• Majority of students (92%) agreed that subject choice is useful to their future careers.	• Most of students (87.5%) agreed subject choice is useful to their future careers while 10% said they were not sure.
• Majority of students (75%) made their own decisions for future careers.	• Most students (67.5%) said they made own decision about their future career while 32.5% said others influenced their decision.
• Other things students would like to learn at school included: computing (28%), technological related subjects and engineering (20%), sports and music(17%), culture (15%) and science (13%).	• Other things students would like to learn at school included: computing (25%), arts subjects (25%), technology subjects (20%), business (10%), food technology subjects (7.5%), science subjects (2.5%).

Existing Technical Education. (Chapter 6, pp. 130-132).	Existing Technical Education (Chapter 8, pp. 181-183).
• Technical education subjects compared with other school subjects is important, useful and needs improvement (68%), not emphasized (27%) and needs revision (5%).	• Students' comparison of the existing technical education with other school subjects were as follows: needs improvement (47.5%), useful and comparable (47.5%) and preparing citizens for future life (5%).
• The level of interest in existing technical subjects in high school were as follows: Yes, interested in (67%), no, not interested in (33%).	• Students' level of interest in existing technical education is as follows: No, not interested in (47.5%), yes, interested in (30%), as optional (15%) and not sure (7.5%).
• Majority of students (95%) perceived existing technical curriculum as relevant.	• Majority of students (90%) agreed that it is relevant.
Technology (Chapter 6, pp. 133-140).	**Technology (Chapter 8, pp. 183-192).**
• Students perceived technology as: artefacts (33%), recent phenomenon (33%), improved efficiency (17%), application and techniques (15%) and problem solving (8%).	• Students perceived technology as an application (45%), recent phenomenon (35%), and artefacts (17.5%).
• Examples of things students see as technology: arefacts (92%) and process (8%).	• Examples of things students perceived as technology included: transport (27.5%), computer (17.5%), shelter (12.5%), fishing (10%), artefacts (5%), farming (5%), kitchen ware (5%), medical (5%), stationery (2.5%), communication (2.5%), engineering (2.5%), sports (2.5%) and textile (2.5%).
• Reasons for choosing previous examples as technology: improved efficiency(53%), technical process (23%), recent phenomenon (15%) and mana (8%).	• Reasons for choosing the previous examples as technology were: improved efficiency (37.5%), recent phenomenon (30%), man-made products (15%), fascinating (12.5%) and application (5%).
• Reasons for liking technological things included: improved efficiency (58%), recent phenomenon (20%), mana (12%) and aesthetically designed (10%).	• Reasons for liking technological things included: improved efficiency (65%), useful and beneficial (17.5%), recent phenomenon (15%) and aesthetic (5%).
• Kinds of technology students would like to learn at school included: computer studies (37%), intermediate technology (37%), engineering technology (22%) and, no interest (5%).	Kinds of technology students would like to learn at school included: computing (30%), electronics and electrical things (22.5%), industrial arts (15%), designing and project making (12.5%), architecture (7.5%), home economics (7.5%) and mechanics (5%).

• What kind of technology students would be interested in doing at school included: computer studies (42%), basic intermediate technology (38%), arts and craft (12%), recent phenomena (3%), and own choice (5%). • Students' perceptions of doing technology at school includes: broadening knowledge (42%), practical activity (30%), learning process (17%) and improving skills (12%).	• What kind of technology students would be interested in doing at school included: computing (35%), electronics (12.5%), wood and metal technology (12.5%), inventive type technology (10%), designing and project making (7.5%), hydroponics agriculture (7.55), home economics (5%), fishing (5%) and own choice (5%). • Perceptions of doing technology at school included: application of practical activities (45.5%), broadening and improving of knowledge and skills (35%), preparation for future (17.5%).
Traditional Technology (Chapter 6, pp. 141-144). • Majority of students (77%) have knowledge of traditional technology while 13% do not know and 10% not sure. • Examples of traditional technologies given by students included: cooking (18%), transport (13%), building (13%), fishing (13%), handicrafts (10%), tools and weapons (7%), manners and protocol (3%), dress and customs (3%), communication (3%), folklore and dances (2%) and don't know/unsure (3%). • Reasons for learning traditional technology included: maintaining identity and survival of culture (95%). • Majority of students (92%) said traditional technology is still useful today.	**Traditional Technology . (Chapter 8, pp. 192-195).** • Majority of students (95%) said they have knowledge of traditional technology. • Examples of traditional technology given by students were as follows: making of canoes (20%), fishing methods and techniques (17.5%), traditional houses (15%), preservation of food (7.5%), weaving mats and hats (7.5%), farming methods (7.5%), preparation of herbal medicine(5%), stone axe and digging sticks (5%), preparation and cooking of food (5%), bows and arrows (2.5%), stone carving (2.5%), making of traditional musical instruments (2.5%) and bird's traps and snares (2.5%). • Reasons for learning traditional technology includes preserving culture (67.5%) and beneficial (32.5%). • The majority of students (87.5%) said that traditional technology is still useful today.

APPENDIX F (2)

Comparison Summary of Educators' Perceptions.

(A comparison between Fiji educators' perceptions and Solomon Islands educators' perceptions).

Educators' Perceptions (Fiji).	Educators' Perceptions (Solomon Islands).
Technical Education (Chapter 7, pp. 148-162).	**Technical Education (Chapter 9, pp. 200-212).**
• Majority of educators (87.5%) said the existing technical education curriculum needed revision while 12.5% said it was adequate.	• Educators perceived the existing technical education curriculum as: needs revision and improvement (45%), struggling (40%), constantly revised (10%) and just another subject (5%).
• The perceived purpose of the existing technical education curriculum as: basic education (47.5%), practical education (40%), sustainable knowledge (7.5%) and, as a classroom subject (5%).	• The perceived purpose of the existing technical education curriculum includes: basic education (40%), practical application and manual activities (30%), knowledge empowerment (10%), tradesmen and artesians (10%), classroom subjects (5%) and preparation for work (5%).
• Technical education when compared to other curriculum was seen as needing revision and improvement (67.5%), comparable and supported (25%) but difficult to compare (7.5%).	• Perceptions of the existing technical education curriculum compared with other curriculum were: needs revision and improvement (45%), lacks emphasis and support (30%), comparable (20% and need qualified teachers (5%).
• Perceived relevance of existing technical education curriculum were as follows: yes, relevant (50%), no, not relevant (30%) and relevant to an extent (20%).	• Educators perceived the existing technical education curriculum as relevant (60%) while 40% said only some parts are relevant.
• Educators' perceptions of students' level of interest in the existing technical education curriculum were as follows: yes, interested (40%), no, not interested (37.5%), difficult to answer (17.5%) and relevant to an extent (5%).	• Educators said that the level of interest of students in the existing technical education curriculum indicated a 75% non-interest and a 25% interest.
• Other subject areas listed by educators which will help in the teaching of technical subjects included: related areas (40%), computing (35%), recent phenomenon (12.5%), other classroom subjects (12.5%).	• List of other subjects to further help in the teaching of technical subjects included: computing (25%), repair and maintenance (20%), teaching methods (10%), electrical skills and electronics (10%), accounting (10%), management (10%), wood chemistry (5%), allied plastics (5%), educational tour (5%).

• Education curriculum includes: lack of resources (42.5%), lack of linking and continuation (15%), obsolete curriculum (12.5%), lack of support and coordination (10%), does not cater for peoples' need (5%), attitude and implementation problems (5%), foreign curriculum (5%) and, lacks hands-on experience (5%). • Suggestions for improvement includes: revise curriculum (32.5%), general suggestions (20%), train quality teachers (10%), introduce support areas (10%), establish continuous linkage (5%), recruit quality students (5%), establish pool of expert resources (2.5%), better coordination mechanism (2.5%), a continuous in-house in-service training program (2.5%), produce local materials (2.5%), establish revolving fund (2.5%), establish mobile technology unit (2.5%) and scrap subject division (2.5%).	• Weaknesses in the existing technical education curriculum includes: lack of resources (40%), lack of support (25%), obsolete curriculum (20%) and lack level of education and balance (15%). • Suggestions to improve quality of technical education curriculum were as follows: review curriculum (35%), more resources (35%), more emphasis (25%) and equal timetable (5%).
Technology . **(Chapter 7, pp. 162-167).** • Educators perceived technology as: recent phenomenon (27.5%), process (22.5%), application (20%), artefacts (15%), hardware and systems (10%) and improved efficiency (5%). • Kind of technology students would be interested in doing at school included: computer technology (17.5%), technology education (12.5%), recent technology (10%), electro type technology (10%), base type technology (7.5%), experimental type technology (5%), engineering technology (5%), food and textile technology (5%), living technology (5%), design (5%), industrial arts (2.5%), automobile and mechanic type technology (2.5%), hydroponics agriculture type technology (2.5%), integrated application technology (2.5%) and own interest and choice (7.5%).	**Technology.** **(Chapter 8, pp. 212-216).** • Educators perceive technology as: application and problem-solving (35%), knowledge and skills (25%), process (20%), artefacts (15%) and improved efficiency (5%). • Educators said that the kind of technology students would be interested in doing at school included: computing (25%), basic technology (25%), electronics (20%), learning about other materials (10%), food technology (10%) and alternative agriculture (10%).

Technology Education (Chapter 7, pp. 167-168).	Technology Education. (Chapter 9, pp. 216-218).
• Perceptions of technology education included: teaching and training (37.5%), application (27.5%), learning (22.5%) and recent phenomenon (12.5%).	• Educators perceived technology education as: education of technology (30%), teaching and learning (25%), methods and techniques (15%), artefacts and usage of artefacts (15%), classroom subjects (10%) and knowledge and skills (5%).
Traditional Technology. (Chapter 7, pp. 169-171).	**Traditional Technology . (Chapter 9, pp. 218-221).**
• Perceptions of traditional technology included the following: cultural heritage (50%), living technology (25%), arts and crafts (12.5%), introduced skills (7.5%) and do not know (5%). • Majority of educators (77.5%) said traditional technology is still useful today while 7.5% said it is not useful and the rest (15%) said they were not sure.	• Educators perceived traditional technology as: methods and application (40%), cultural heritage (30%), living technology (20%) and artefacts (10%). • The majority of educators (90%) said traditional technology is still useful today.

APPENDIX F (3)

Comparison Summary between Fiji Students' perceptions and Fiji Educators' perceptions

Students Perceptions (Fiji).	Educators' Perceptions (Fiji).
Existing Education Technical Curriculum (Chapter 6, pp. 130-132).	**Existing Technical Education Curriculum (Chapter 7, pp. 148-162).**
• Technical education subjects compared with other school subjects is important, useful and needs improvement (68%), not emphasized (27%) and needs revision (5%).	• Technical education when compared to other curriculum was seen as needing revision and improvement (67.5%), comparable and supported (25%) but difficult to compare (7.5%).
• The level of interest in existing technical subjects in high school were as follows: Yes, interested in (67%), no, not interested in (33%).	• Educators' perceptions of students' level of interest in the existing technical education curriculum were as follows: yes, interested (40%), no, not interested (37.5%), difficult to answer (17.5%) and relevant to an extent (5%).
• Majority of students (95%) perceived existing technical curriculum as relevant.	• Perceived relevance of existing technical education curriculum were as follows: yes, relevant (50%), no, not relevant (30%) and relevant to an extent (20%).
	• The perceived purpose of the existing technical education curriculum as: basic education (47.5%), practical education (40%), sustainable knowledge (7.5%) and, as a classroom subject (5%).
	• Majority of educators (87.5%) said the existing technical education curriculum needed revision, while 12.5% said it was adequate.
	• Other subject areas listed by educators that would help in the teaching of technical subjects included: related areas (40%), computing (35%), recent phenomenon (12.5%), other classroom subjects (12.5%).
	• Weakness of the existing technical education curriculum included: lack resources (42.5%), lacks linking and continuation (15%), obsolete curriculum (12.5%), lack of support and coordination (10%), does not cater for peoples' needs (5%), attitude and implementation problems (5%), foreign curriculum (5%) and, lacks hands-on experience (5%).

	• Suggestions for improvement includes: revise curriculum (32.5%), general suggestions (20%), train quality teachers (10%), introduce support areas (10%), establish continuous linkage (5%), recruit quality students (5%), establish pool of expert resources (2.5%), better coordination mechanism (2.5%), a continuous in-house in-service training program (2.5%), produce local materials (2.5%), establish revolving fund (2.5%), establish mobile technology unit (2.5%) and scrap subject division (2.5%).
Technology (Chapter 6, pp. 133-140). • Students perceived technology as: artefacts (33%), recent phenomenon (33%), improved efficiency (17%), application and techniques (15%) and problem solving (8%). • Examples of things students see as technology: arefacts (92%) and process (8%). • Reasons for choosing previous examples as technology: improved efficiency(53%), technical process (23%), recent phenomenon (15%) and mana (8%). • Reasons for liking technological things included: improved efficiency (58%), recent phenomenon (20%), mana (12%) and aesthetically designed (10%). • Kinds of technology students would like to learn at school included: computer studies (37%), intermediate technology (37%), engineering technology (22%) and, no interest (5%).	**Technology . (Chapter 7, pp. 162-167).** • Educators' perceived technology as: recent phenomenon (27.5%), process (22.5%), application (20%), artefacts (15%), hardware and systems (10%) and improved efficiency (5%).

• Kinds of technology students would be interested in doing at school included: computer studies (42%), basic intermediate technology (38%), arts and craft (12%), recent phenomena (3%), and own choice (5%). • Students' perceptions of 'doing technology' at school included: broadening knowledge (42%), practical activity (30%), learning process (17%) and improving skills (12%).	• Kinds of technology students would be interested in doing at school included: computer technology (17.5%), technology education (12.5%), recent technology (10%), electro type technology (10%), base type technology (7.5%), experimental type technology (5%), engineering technology (5%), food and textile technology (5%), living technology (5%), design (5%), industrial arts (2.5%), automobile and mechanic type technology (2.5%), hydroponics agriculture type technology (2.5%), integrated application technology (2.5%) and own interest and choice (7.5%).
Traditional Technology (Chapter 6, pp. 140-144). • Majority of students (77%) have knowledge of traditional technology while 13% do not know and 10% not sure. • Examples of traditional technologies given by students included: cooking (18%), transport (13%), building (13%), fishing (13%), handicrafts (10%), tools and weapons (7%), manners and protocol (3%), dress and customs (3%), communication (3%), folklore and dances (2%) and don't know/unsure (3%). • Reasons for learning traditional technology included: maintaining identity and survival of culture (95%). • Majority of students (92%) said traditional technology is still useful today.	**Traditional Technology. (Chapter 7, pp. 169-171).** • Perceptions of traditional technology included the following: cultural heritage (50%), living technology (25%), arts and crafts (12.5%), introduced skills (7.5%) and do not know (5%). • Majority of educators (77.5%) said traditional technology is still useful today while 7.5% said it is not useful and the rest (15%) said they were not sure.

APPENDIX F (4)

Comparison Summary of Solomon Islands Students' perceptions and Solomon Islands Educators' perceptions.

Students Perceptions (Solomon Islands)	Educators Perceptions (Solomon Islands)
Existing Technical Education (Chapter 8, pp. 181-183).	**Existing Technical Education Curriculum (Chapter 9, pp. 200-213).**
• Students' comparison of the existing technical education with other school subjects were as follows: needs improvement (47.5%), useful and comparable (47.5%) and preparing citizens for future life (5%).	• Perceptions of the existing technical education curriculum compared with other curriculum were: needs revision and improvement (45%), lacks emphasis and support (30%), comparable (20% and need qualified teachers (5%).
• Students' level of interest in existing technical education is as follows: No, not interested in (47.5%), yes, interested in (30%), as optional (15%) and not sure (7.5%).	• Educators said that the level of interest of students in the existing technical education curriculum indicated a 75% non-interest and a 25% interest.
• Majority of students (90%) agreed that it is relevant.	• Educators perceived the existing technical education curriculum as relevant (60%) while 40% said only some parts are relevant.
	• Educators perceived the existing technical education curriculum as: needs revision and improvement (45%), struggling (40%), constantly revised (10%) and just another subject (5%).
	• The perceived purpose of the existing technical education curriculum included: basic education (40%), practical application and manual activities (30%), knowledge empowerment (10%), tradesmen and artesians (10%), classroom subjects (5%) and preparation for work (5%).

	• List of other subjects to further help in the teaching of technical subjects included: computing (25%), repair and maintenance (20%), teaching methods (10%), electrical skills and electronics (10%), accounting (10%), management (10%), wood chemistry (5%), allied plastics (5%), educational tour (5%). • Weaknesses of the existing technical education curriculum includes: lack of resources (40%), lack of support (25%), obsolete curriculum (20%) and lacks level of education and balance (15%). • Suggestions to improve quality of technical education curriculum were as follows: review curriculum (35%), more resources (35%), more emphasis (25%) and equal timetable (5%).
Technology. **(Chapter 8, pp. 183-192).** • Students perceived technology as an application (45%), recent phenomenon (35%), and artefacts (17.5%). • Examples of things students perceived as technology included: transport (27.5%), computer (17.5%), shelter (12.5%), fishing (10%), artefacts (5%), farming (5%), kitchen ware (5%), medical (5%), stationery (2.5%), communication (2.5%), engineering (2.5%), sports (2.5%) and textile (2.5%). • Reasons for choosing the previous examples as technology were: improved efficiency (37.5%), recent phenomenon (30%), man-made products (15%), fascinating (12.5%) and application (5%). • Reasons for liking technological things included: improved efficiency (65%), useful and beneficial (17.5%), recent phenomenon (15%) and aesthetic (5%).	**Technology.** **(Chapter 9, pp. 213-216).** • Educators perceive technology as: application and problem-solving (35%), knowledge and skills (25%), process (20%), artefacts (15%) and improved efficiency (5%).

• Kinds of technology students would like to learn at school included: computing (30%), electronics and electrical things (22.5%), industrial arts (15%), designing and project making (12.5%), architecture (7.5%), home economics (7.5%) and mechanics (5%). • Kinds of technology students would be interested in doing at school included: computing (35%), electronics (12.5%), wood and metal technology (12.5%), inventive type technology (10%), designing and project making (7.5%), hydroponics agriculture (7.55), home economics (5%), fishing (5%) and own choice (5%). • Perceptions of doing technology at school included: application of practical activities (45.5%), broadening and improving of knowledge and skills (35%), preparation for future (17.5%).	• Educators said that the kinds of technology students would be interested in doing at school included: computing (25%), basic technology (25%), electronics (20%), learning about other materials (10%), food technology (10%) and alternative agriculture (10%).
Traditional Technology . **(Chapter 8, pp. 192-195).** • Majority of students (95%) said they have knowledge of traditional technology. • Examples of traditional technology given by students were as follows: making of canoe (20%), fishing methods and techniques (17.5%), traditional houses (15%), preservation of food (7.5%), weaving mats and hats (7.5%), farming methods (7.5%), preparation of herbal medicine(5%), stone axe and digging sticks (5%), preparation and cooking of food (5%), bows and arrows (2.5%), stone carving (2.5%), making of traditional musical instruments (2.5%) and bird traps and snares (2.5%). • Reasons for learning traditional technology included preserving culture (67.5%) and beneficial (32.5%). • The majority of students (87.5%) said that traditional technology is still useful today.	**Traditional Technology .** **(Chapter 9, pp. 216-218).** • Educators' perceived traditional technology as: methods and application (40%), cultural heritage (30%), living technology (20%) and artefacts (10%). • The majority of educators (90%) said traditional technology is still useful today.

APPENDIX F (5)

Comparison summary between Students' Perceptions and Educators' Perceptions of Fiji and the Solomon Islands.

(Combined students' perceptions and combined educators' perceptions)

STUDENTS' PERCEPTIONS (Fiji + Solomon Islands Students).	EDUCATORS' PERCEPTIONS (Fiji + Solomon Islands Educators).
Perceptions of the Existing Technical Education Curriculum.	**Perceptions of the Existing Technical Education Curriculum.**
• When compared with other school curriculum students perceived it as important, useful but needs improvement and revision. Not emphasised.	• When compared with other school curriculum educators perceived it as needing revision and improvement. Difficult to compare.
• Students agree there is level of interest but in various degree although more Solomon Islands students showed less interest.	• Fiji educators stated that there is a student level of interest while Solomon Islands educators stated there is less student interest and further stated that it was difficult to say.
• Majority of students (90% Fiji & 95% Solomon Islands) agreed that it is relevant.	• Educators of both countries agreed that the existing technical education is relevant to an extent.
Perceptions of Technology (Fiji + Solomon Islands Students).	**Perceptions of Technology. (Fiji + Solomon Islands Educators).**
• Students viewed technology as (a) artefacts, (b) recent phenomenon, (c) improved efficiency and, (d) application and problem solving.	• Educators viewed technology as (a) recent phenomenon, (b) application and problem-solving, (c) process, (d) artefacts (e) improved efficiency.
• Students' choice of the kind of technology they would be interested in doing at school include (a) computing as first choice, (b) basic intermediate technology such as electrical, electronic and mechanical, (c) arts & craft (d) designing project type technology, and (e) own choice.	• Educators stated that the kinds of technology students would be interest in doing at school would include: (a) computing as first choice, (b) basic technology, (c) recent technology – high tech, (d) material technology, (e) food technology, and (f) alternative type technology such as hydroponics.

Perceptions of Traditional Technology. (Fiji + Solomon Island Students).	Perceptions of Traditional Technology. (Fiji + Solomon Islands Students).
• Majority of students (77% Fiji & 95% Solomon Islands) have a knowledge of traditional technology and this was shown in the numerous examples they give which range from the making of canoes to musical instruments. They viewed traditional technology as cultural things, knowledge and skills developed by ancestors and passed down from one generation to the next generation.	• Educators viewed traditional technology as (a) cultural heritage, (b) living technology, (c) way of doing things (methods & techniques), and artefacts (arts & crafts).
• Majority of students (92% Fiji & 87.5% Solomon Islands) stated that traditional technology is still useful today.	• Majority of educators (77.5% Fiji & 90% Solomon Islands) viewed traditional technology as still very useful today.

APPENDIX G

Appendix G (1): Consent Letter to Conduct Research in Fiji Schools.

Appendix G (2): Letter of Permission to Conduct Research in Fiji. Approval obtained from Mr Amraiya Naidu, The Permanent Secretary, Ministry of Education, Fiji.

Appendix G (3): Consent Letter to Conduct Research in Solomon Island Schools.

Appendix G (4): Research Permit to Conduct Research in the Solomon Islands. Approval obtained from the Honourable Minister of Education, Mr Ronidy Manni, Ministry of Education, Solomon Islands.

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Fax: (679) 302548

Date: 20 February 1997

Mr Amraiya Naidu
The Permanent Secretary
Ministry of Education
Marela House.

Dear Sir,

Subject: Request permission to conduct research work.

I am a staff of the Department of Technology at the University of the South Pacific. The purpose of this letter is to request permission to conduct research work in the technical section of the high school curriculum. My research topic is 'Technology education in the South Pacific: a case study of Fiji.' The research will look into the reasons for apathy in technical subjects. The study will interview technical students, technical teachers and principals. The interviews will be taped, transcribed and analysed for base information. The research will be conducted sometimes this year (1997) or next year (1998) over few months. This research is towards a PhD degree. Thank you.

Yours sincerely,

Alfred Ghere Liligeto.
(Lecturer)

ALL COMMUNICATIONS TO BE ADDRESSED TO THE PERMANENT SECRETARY FOR EDUCATION AND NOT TO INDIVIDUAL OFFICERS.

MINISTRY OF EDUCATION,
MARELA HOUSE,
SUVA, FIJI.

Phone No. 314477
Fax No. 303511

IN REPLY PLEASE QUOTE:

CF29/13/1

6 March 1997

Mr Alfred Ghere Liligeto
Lecturer: Department of Technology
School of Pure and Applied Sciences
University of the South Pacific
P O Box 1168
SUVA

Dear Mr Liligeto

REQUEST FOR PERMISSION TO CARRY OUT RESEARCH WORK

Approval is granted for you to undertake research work on Technology Education in the South Pacific: a case study of Fiji on condition that you will discuss your findings with us and also provide us a copy of the thesis. Additionally, you would be required to liaise with us to facilitate your visits to schools.

Yours sincerely

A Naidu
Permanent Secretary for Education, Women & Culture

The University of Waikato
Te Whare W nanga o Waikato

Centre for Science, Mathematics and Technology Education Research
Te Kauhanganui o te Pangarau, te P taiao me te Hangarau Rangahau M t

Private Bag 3105, Hamilton, New Zealand
Telephone (07) 856 2889, Centre direct line (07) 838 4035, Centre Fax (07) 838 4272

Date: 12 April, 1997.

PhD Thesis:

Towards a framework for technical education in some Pacific Islands Countries: Solomon Islands and Fiji.

Who am I?
My name is **Alfred Ghere Liligeto** and I am from the Solomon Islands. I am a DPhil postgraduate student at the Centre for Science, Mathematics and Technology Education Research (CSMTER) at the University of Waikato, Hamilton, New Zealand. I hold a Certificate in Industrial Arts, a Diploma of Education in social science; a Bachelor of Education with a double major in Industrial Arts and Education, a Master of Arts in technical education and a Master of Science in Construction Technology. I am currently enrolled in the Doctor of Philosophy programme in the Technology Education programme. I have 3 years teaching experience at high school level and 15 years as a lecturer at the University of the South Pacific. At USP I am involved in the training of technology teachers for high schools.

What is this thesis about?
The purpose of this research is to establish a base and guideline for the framework for the curriculum development process. In the past, curriculum development has been through the adoption of the former colonial administration curriculum which is often not appropriate. No consideration was given to the perspective, aspirations, culture and interpretation of the local people. It was the belief that by considering the local perspectives, a much more appropriate curriculum could be developed. Previous international research has shown that this has been the case (Jones & Carr, 1992). The reason for selecting educators and students was because the educators' experiences will influence education, while student contribute to the learning processes. Two countries were chosen for this fieldwork, the Solomon Islands and Fiji. Two groups of people will be interviewed, that is, students and educators. The perceptions of students and educators will be used to form the basis for a framework for curriculum development. Currently there is no technology education curriculum in existence in the South Pacific, and no prior research has been done in this area. This research will lay the foundation for future curriculum development.

What are the requirements for participating in this research?
This research requires visiting to schools to interview students and educators face-to-face regarding their perception of technical education, technology, technology education and traditional technology in their country. Specific questions will asked in these areas and these will be recorded by tape and transcribed. The interview will be informal and will take about 20 minutes. All data collected will be confidential and the transcript will be made available to participants on request. Nothing will be published without the consent of participants. The research will follow research ethic regulations.

Permission to conduct research?
I am writing this letter to you requesting permission to conduct field research work in the high schools in the Solomon Islands. The research will be conducted over a period of several months in 1997 and 1998. Thank you.

Alfred Ghere Liligeto
CSMTER, University of Waikato,
Private Bag 3105, HAMILTON,
New Zealand.

Ph: (07) 856 2889 Ext 8926 (Manual)
Fax: (07) 838 4272 CSMTER
e-mail: agl2@waikato.ac.nz

FORM - R.B.

RESEARCH PERMIT

Permission is hereby given to:

1. Name: Alfred Ghere Liligeto (DPhil)

2. Country: S.I

3. To undertake research in (subject): Towards a Framework for Technical Education in some Pacific Islands Country : SI & Fiji

4. Area Council(s): Honiara Schools - KGVI, SICHE, TENARU, SELWYN, BETIKAMA, HONIARA HIGH SCHOOL, RUAVATU

5. Province(s): Honiara Town Council, Guadalcanal

6. Conditions:

   a. To undertake research only in the subject areas specified in 3 above.

   b. To undertake research only in the Area Council specified in 4 and the Province(s) specified in 5.

   c. To observe with respect at all times local customs and the way of life of the people in the area in which the research work is carried out.

   d. You must not, at any time, take part in any political or missionary activities or local disputes.

   e. You must leave 4 copies of your final research report in English with the Solomon Islands Government (Ministry responsible research) at your own expense.

   f. A Research Fee of $........................ and deposit a sum of $........................ must be paid in full or the Research Permit will be cancelled. (See Sect. 3 Subject. 7 of the Research Act).

   g. This research is valid until Oct 1997- Dec 1998 provided all conditions are adhered to.

   h. A failure to observe the above conditions will result in the automatic cancellation of this permit and the forfeit of your deposit.

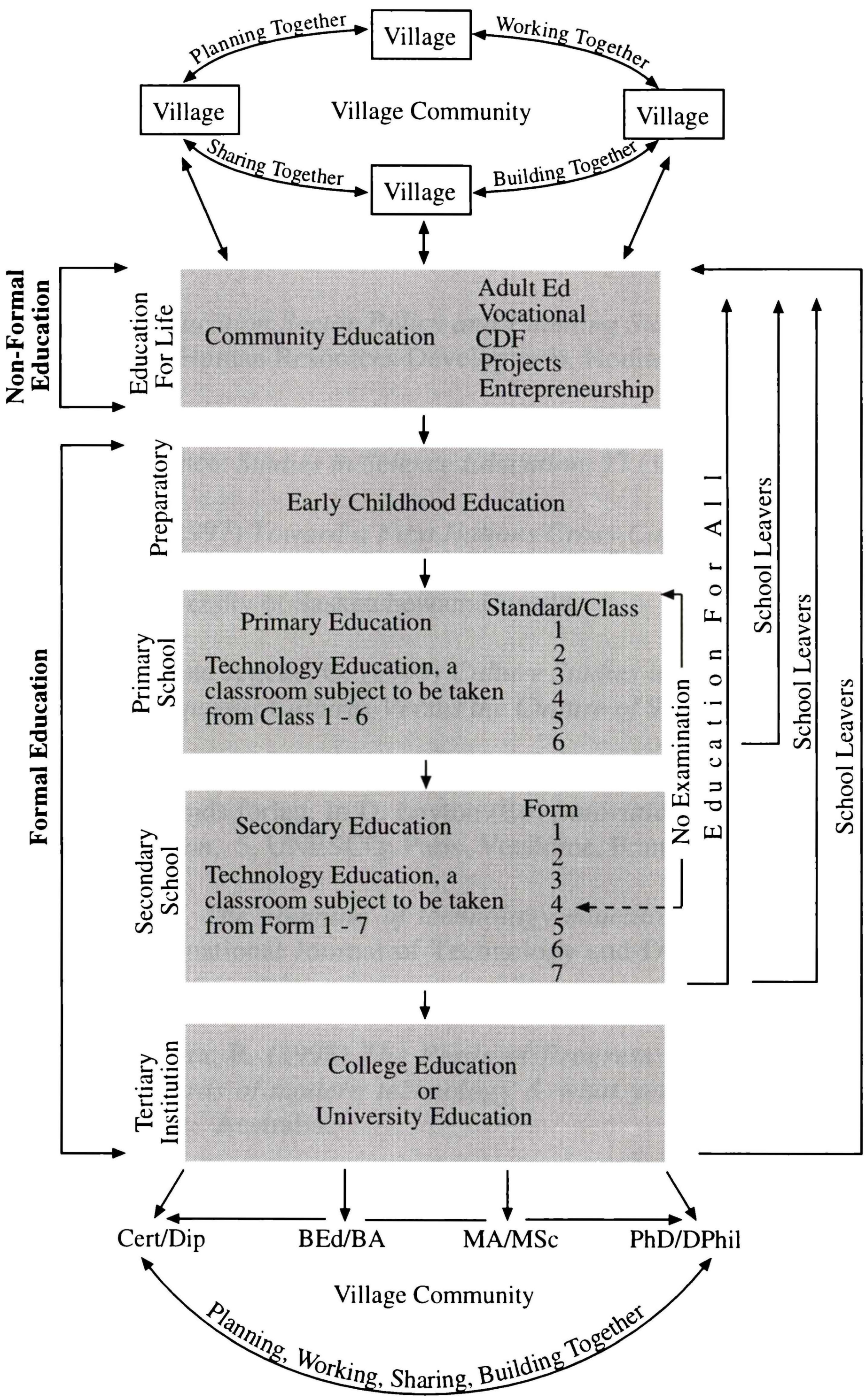
Signed: Hon. Ronidy Manni
MINISTER FOR EDUCATION & HUMAN RESOURCES DEVELOPMENT

Date: 21/10/97

APPENDIX H

A proposed structure of an education system for the South Pacific Island Countries beyond 2000 supporting the introduction of technology education curriculum.

Education System 2000 and Beyond



A proposed structure of an education system for the South Pacific Island Countries beyond 2000 suggesting equal status for both academic and technology education subjects from Forms 1-7. This broad-based non-gender biased education process at high school is basically for foundation-building. At the beginning of university academic year students should be mature enough to choose either to pursue academic or technology education career-type study.

REFERENCES

ADB Report, (1998) *Solomon Islands 1997 Economic Report*, ADB Report Pacific Studies Series, Office of Pacific Operation, Information Office: Manila, Philippines.

AIDAB, (1991) *Education Sector Policy and Planning Statement*, Ministry of Education and Human Resources Development, Honiara.

Aikenhead, G. S. (1996) Science Education: Border Crossing into the Subculture of Science. *Studies in Science Education*, 27 (1-52).

Aikenhead, G. S. (1997) *Toward a First Nations Cross-Cultural Science and Technology Curriculum*, 81(2), Culture and Comparative Studies, Science Education, University of Saskatchewan: Canada.

Aikenhead, G. S., and Jegede, O. (1999) *Culture Studies in Science Education: Students' Indigenous Cultures Versus the Culture of Science*, Boston, USA.

Allingbjerg, C. (1983) SLOYD i Danmark 188-1983. Bakgrund og vilkar. Aarhus, Dansk Skoleslojds forlag. In D. Layton (Ed) *Innovations in Science and Technology Education*, 5, UNESCO: Paris, Vendome, France.

Ankiewicz, (1995). *The planning of technology education for South African schools,* International Journal of Technology and Design Technology, 5, pp 245-254.

Ashton, J. and Laura, R. (1998) *The Perils of Progress: The health and environment hazards of modern technology & what you can do about them*, UNSW Press: Australia.

AUSAID. (1999) *AUSAID Technical And Vocational Education Project Report*, Tonga Ministry of Education, Community Development Training Centre: Nukualofa.

Ausubel, D. (1968) Educational Psychology, In R. Osborne and P. Freyberg (Eds), *Learning in Science: The Implications of Children's Science*, Heinemann: Auckland.

Baba, T. L. (1986) *Directions and Strategies for Technology Education in Fiji*, Keynote address at the Annual Conference of the Institute of Industrial Arts at Fiji Institute of Technology, Suva: Fiji. pp1-11.

Baba, T. L. (1984) *Education in the South Pacific in the Year 2000*, East-West Center, Hawai'i. Paper presented at the East-West Center, University of Hawai'i. pp1-23.

Bainbridge, W. S. (1992) *Social Research Methods and Statistics: a Computer-Assisted Instruction*, Belmont CA: Wadsworth Publishing Co, pp 461-466.

Bakalevu, S. L (1998) *Fijian Perspective in Mathematics Education*, CSMTER, The University of Waikato, School of Science and Technology: Hamilton, New Zealand. (PhD Thesis).

Ball, S. J., and Goodson, F. I. (1985) Understanding Teachers: Concepts and Contexts. In S. J. Ball and I. F. Goodson (Eds), *Teachers' Lives and Careers*. Falmer Press, Lewes.

Bannister, P. Burman, E. Parker, I. Taylor, M and Tindell, C (1994) *Qualitative Methods in Psychology: A research guide*, Open University Press: Philadelphia, USA.

Barnett, M. (1995) *Literacy, Technology and 'Technological Literacy'*, International Journal of Technology Education and Design Education, 5, Kluwer: Netherlands. pp 119-137.

Bartley, S. H. (1958) *Principles of Perception*, Harper & Row: NY, Evanston. USA.

Basha, K. (1981) *The needs for Industrial Arts Education in Fiji Secondary School*, The Graduate College University of Wisconsin-Stout: Wisconsin, USA.

Battiste, M., and Barman, J. (1995) First Nations Education in Canada: The Circle Unfolds. In G. L. Aikenhead (Ed) *Toward First Nations Cross-Cultural Science and Technology Education.*, Culture and Comparative Studies, 81, (2), April 1997, Wiley: Canada. pp217-238.

Baumgart, N., and Fry, G. (1994) *Technology in the Curriculum: A View from Fourteen Countries*, The Journal of the Pacific Circle Consortium for Education, 6, (1), Pacific-Asian Education. Hobart. pp 32-36.

Begg, A. (1996) *Getting Behind the Curriculum: Teachers as Curriculum Developers*, Teachers and Curriculum, 2, Leaders Press, School of Education, University of Waikato, Hamilton, New Zealand. pp 1-20.

Begg, A. (1999) Constructivism: *An Overview and Some Application*, Seminar: Auckland College of Education, Centre for Science, Mathematics and Technology Education Research (CSMTER), University of Waikato, Hamilton: New Zealand. pp 1-15.

Begg, A. (2000) *Curriculum and Teachers*, Maths Education Seminar, Centre for Science, Mathematics and Technology Education Research (CSMTER), University of Waikato: Hamilton, New Zealand. pp 1-9.

Bell, B. (1993) *Children's Science, Constructivism and Learning in Science*, Deakin University Press: Geelong, Victoria, Australia 3217.

Bell, B. and Baker, R. (1997) *Developing the Science Curriculum in Aotearoa New Zealand*, Longman: Auckland, New Zealand.

Bell, B., and Gilbert, J. (1996)*Teacher Development: A Model from Science Education,* Falmer Press: London.

Bell, B. Jones, A and Carr, M. (1995) The Development of the Recent National New Zealand Science, *Curriculum Studies in Science Education*, 26, pp 73-105.

Bennett, J. A (2000) *Pacific Forest: A History of Resource Control and Contest in the Solomon Islands, c. 1800-1997*, The White Horse Press, Cambridge, UK and Brill Academic Publishers: Leiden, Netherlands.

Bennett, J. A. (1987) *Wealth of Solomon Islands: A history of a Pacific Archipelago*, 1800-1978, Monograph Series No. 3, University of Hawaii Press, USA.

Bibby, M. (1997) *Ethics and Education Research: Review of Australian Research in Education, 4*, Australian Association for Research in Education, Inc: Victoria, Australia.

Birley, G., and Moreland, N. (1998) *A Practical Guide to Academic Research*, Kogan Page: London.

Black, P. J. (1994) *Technology in the school curriculum:* Papers from Science, Mathematics and Technology (SMT) Education in OECD countries.

Blandow, D., and Mosna, F. (1994) Technology education in Central and Eastern Europe, In D. Layton (Eds), *Innovations in science and technology education*, Volume V, UNESCO: Vendome, France.

Blaxter, L., Hughes, C. and Tight, M. (1998) *How to Research*, Open University Press: Buckingham, UK.

Bole, F. (1975) *Opening of the Industrial Arts Teachers' Conference*, In P. Q. Tukunia (Ed) Industrial Arts Research and Development Board, The University of the South Pacific: Suva, Fiji.

Bouma, G. D. (1996) *The Research Process*, Oxford University Press (3rd Ed): UK.

Bouma, G. D. (2000) The Research Process, Oxford University Press (4th Ed): UK.

Bowker, J. (1997) *The Oxford Dictionary of World Religions*, Oxford University Press.

Brady, P. (1995) Two Policy Approaches to Native Education: Can Reform be Legislated? In G. S. Aikenhead (Ed), *Towards a First Nations Cross-Cultural Science and Technology Curriculum*, Culture and Comparative Studies, 81 (2), April 1997, Wiley Publishers: Canada. pp 217-238.

Brewer, J. and Hunter, A. (1989) *Multimethod Research: A Synthesis of Style*, Sage Library of Social Research 175, SAGE, London.

Brinberg, D. and McGrath, J. E. (1985) *Validity and the Research Process*, SAGE, London.

Bugotu, F. (1972) *Education for what?* Solomon Island Government: Honiara, Solomon Islands.

Bunge, M. (1973) *Philosophical Imputs and Outputs of Technology*, In Bugliarello G. and Doner D. (Eds), The History and Philosophy of Technology. Chicago, University of Illinois Press: USA.

Burns, J. (1990) *Students' attitudes towards and concepts in technology*, Report to the Ministry of Education, Wellington.

Burns, J. (1992) *Students' Perceptions of Technology and Implications for Empowering Curriculum*, Research in Education, 22, pp72-80.

Burns, J. (1997) *Technology - Intervening in the World*, In J. Burns (Ed), Technology in the New Zealand Curriculum: Perspectives on Practice, The Dunmore Press, Palmerston North, New Zealand.

Burt, B (1994) *Tradition and Christianity: A Colonial Transformation of a Solomon Island Society*, Harwood AcademiC: UK.

Burt, B (1997) *Living Tradition: A Changing Life in Solomon Islands*, British Museum Press: UK.

Butterworth, G., and Butterworth, S. (1998) *Reforming Education: The New Zealand Experience 1984-1996*, The Dunmore Press: Palmerston North, New Zealand.

Cakanasiga, I. J. (1982) Towards a meritocratic society through comprehensive education. In H. Tavola (Ed) *Secondary Education in Fiji: A Key to the Future*, Institute of Pacific Studies, The University of the South Pacific: Suva, Fiji.

Cannell, C. F., and Kahn, R. L. (1968) *Interviewing*, Addison Wesley, NY. In L. Cohen and L. Manion, (1997) Research Method in Education (4th Ed): Routledge, NY.

Carswell, J. M. (1966) *Report to the Western Pacific High Commission on the development of technical education in the British Solomon Islands Protectorate*, Department of Education, New South Wales, Australia.

Chaudhry, M. (1999) *Chaudhry's Promise to Fijian*, URLhttp://www.Fijilive.com

Chinien, C. A. (2000) *A Nationål Census on Technology Education in Canada*, Digital Library and Archives formerly the scholarly communication project, URL: http://scholar.lib.vt.edu/ejournals/JITE/v32n2/chinien.html.

Chubin, D. E. (2000) Reculturing Science, Politics, Policy and Promises to Keep. In D. E. Kumar and D.E. Chubin (Eds), *Science, Technology, and Society: A Sourcebook on Research and Practice*, Innovations in Science Education and Technology , Kluwer: NY.

Cohen, L., and Manion, L. (1997) *Research Methods in Education* (4th Ed), Routledge, London & New York.

Cohen, L. Manion, L., and Morrison, K. (2000) *Research Methods in Education* (5th Ed), Routledge, Falmer, Taylor & Francis Group, NY.

Cobern, W. W. (1996) *The Cultural Nature of the Concept "Scientific Worldview"*, Department of Teaching, Learning & Leadership, Western Michigan University, Kalamazoo. pp 1-17.

Conway, R. (1994) Values in Technology Education, *International Journal of Technology Education and Design Education*, Volume 4, Kluwer: Netherlands. pp 109-116.

Creswell, J. W. (1994) *Research Design: Qualitative & Quantitative Approaches*, SAGE Publications: Thousand Oaks, USA.

Crocombe, R., and Crocombe, M. (1994) *Post Secondary Education in the South Pacific: Educational development in the small states of the Commonwealth*, Commonwealth Secretariat, Marlborough House, Pall Mall, London, UK.

Custer, R. L. (1995) *Examining the Dimension of Technology*, International Journal of Technology and Design Technology, Volume 5, Kluwer: Netherlands. pp 219-244.

Cygnaeus, U. (1994) Technology Education in the Nordic Countries. In D. Layton (Ed) *Innovations in Science and Technology Education*, 5, UNESCO: Paris, Vendome, France.

Davis Report (1992). *Solomon Islands Secondary Curriculum Renewal*, Ministry of Education, Human Resources and Development: Honiara.

Delailomaloma, (2000) *Minister Calls to Scrap Exams*, URL http://www.Fijilive.com.

De Miranda, M. A., and Folkestad, J. E. (1999) *Connect*:: UNESCO International Science, Technology & Environmental Education Education Newsletter, 24 (4) UNESCO Education Sector: Paris, France.

Denzin, N. K. (1978) The Research Act: A Theoretical Introduction to Socilogical Methods (2nd Ed), McGraw-Hill, NY In John P Keeves (Ed), *Educational Research, Methodology, and Measurement: An International Handbook*, Oxford: Pergamon Press, 1988. Pp511-513.

Denzin, N. K., and Lincoln, Y. S. (1994) *Handbook of Qualitative Research*, SAGE Publications, Thousand Oak: USA.

Department of Education, (1989) *A Draft National Curriculum Statement for New Zealand Schools*, Wellington, New Zealand.

Derrick, R. A (1957) *The Fiji Islands: A geographical Handbook*, Colonial Government Press: Suva, Fiji.

Descartes, R. (1995) In I. Rock (Ed), *Perception*, Scientific American Library, A Division of HPHLP, NY, USA.

DeVore, P. W. (1980) Technology: An Introduction. Davis Publications, Worcester, Massachussetts. In R. Hansen & M. Froelich (Eds), *Defining Technology and Technological Education: A Crisis, or Cause for Celebration?,* International Journal of Technology and Design Education 4, Kluwer: Netherlands, 1994. pp179-207.

de Vries, M. J. (Fall 1996) *Technology Education: Beyond the "Technology Is Applied Science" Paradigm*, International Journal of Technology and Design Education, 8 (1). pp 1-6.

de Vries, M. J. (1991) *What do students in Dutch Technology Teacher Programme think of their subjects?*, Research in Science & Technological education, 9 (2), Carfax: Abingdon, Oxfordshire, UK. pp 173-179.

de Vries, M. J. (1994) *Technology education in Western Europe*, In D. Layton (Ed) Innovations in science and technology education, 5, UNESCO: Vendome, France.

Douglass, G. W. (1972) *A Critical Assessment of the responsibilities of the educational system in the technical sphere*, The University of the South Pacific: Fiji.

Driver, H. (1980) A response to a paper by Michael Shayer. In R. Osborne and P. Freyberg (Eds) *Learning in Science: The Implications of Children's Science*, Heinemann: Auckland.

Dyrenfurth, M. (1994) *Technology Education in the United States, Innovation in Science and Technology*, 5, UNESCO: Vendome, France.

Dyrenfurth, M. J. and Mihalevich, J. R. (1987) Technological Literacy: More than computer literacy! In R. Hansen & M. Froelich (Eds) *Defining Technology and Technological Education: A Crisis, or Cause for Celebration?*, International Journal of Technology and Design Education 4, Kluwer: Netherlands. 1994. pp179-207.

Eason, W. J. E. (1951) *A Short History of Rotuma*, Government Printing Department: Suva, Fiji.

Eisner, E. (1994) *The Educational Imagination* (3rd Ed.): Macmillan, NY.

Ellui, (1980) *The Technological Society*, Vintage Books: NY.

Elbert, S. H and Monberg, T. (1965) *From the two canoes: Oral traditions of Rennell and Bellona Islands*, University of Hawai'i Press in cooperation with the Danish National Museum, Copenhagen.

Evening, L. L. (1998) *Exploration into the Under-Representation of Girls in Physics in Fiji Secondary Schools*, CSMTER, University of Waikato: Hamilton, New Zealand (MPhil Thesis).

Fangalasu'u, J. (1994) *Planter: The Birth of the S.S.E.C. and Mission Work in Solomon Islands*, Solomon Islands College of Higher Education, Honiara, Solomon Islands.

Feenberg, A. (1999) *Questioning Technology*, Routledge: London.

Fensham, P., Gunstone, R., & White, R. (1995) *The Content of Science: A Constructivist Approach to its Teaching and Learning*, The Falmer Press: London.

Ferch, A. J. (1986) *Symposium on Adventist History in the South Pacific: 1885-1918*, South Pacific Division of the Seventh-day Adventists: Wahroonga, NSW 2076.

Fiji Act (1997) *Constitution (Amendment) Act 1997 of the Republic of the Fiji Islands*, Government Printing Department: Suva, Fiji.

Fijilive.com, (1999a) *Teachers Welcome Commission*, URLhttp://www.Fijilive.com.

Fijilive.com, (1999b) *Education Commission Sought by Government*, URLhttp://www.Fijilive.com.

Forgus, R. H (1966) *Perception*, McGraw-Hill Book Company: NY.

Forgus, R. H. and Melamed, L. E. (1976) *Perception: A Cognitive-Stage Approach* (2nd Ed), McGraw-Hill Book Company: NY.

Forum, (1996) Fiji, In South Pacific Forum Secretariat (Ed), *Forum Investment Climate in South Pacific Forum Countries*, South Pacific Forum Secretariat: Suva, Fiji.

Foster, P. N. (1995) *The Founders of Industrial Arts in the US*, Journal of Technology Education, 7 (1).

Fox, C. E (1975) *The Story of the SOLOMONS*, Pacific Publications, Sydney, Australia.

Franklin, U. M. (1992) The Real World of Technology, House of Anansi Press Ltd., Concord, ON. In Conway (Ed) *Values in Technology Education*, International Journal of Technology and Design Education 4, Kluwer: Netherlands. 1994. pp109-116.

Fullan, M. (1993) *Change Forces: Probing the Depths of Educational Reform,* Falmer Press: London.

Gardner, P. L (1994) *The Relationship Between Technology and Science: Some Historical and Philosophical Reflections*, International Journal of Technology and Design Education, 4, Kluwer: Netherlands. pp123-153.

Gardner, P. L. (1997) *The Root of Technology and Science: A Philosophical and Historical View*, International Journal of Technology and Design Education, 7, Kluwer: Netherlands. pp 13-20.

Gagne, R. M. and White, R. T. Memory Structure and Learning Outcomes, Review of Educational Research, 187-272. In R. Osborne and P. Freyberg (Eds), *Learning in Science: The Implications of Children's Science*, Heinemann: Auckland.

Gailer Report, (1967) *The development of technical education in the British Solomon Islands Protectorate*, NSW, Australia.

Garrett, J. (1992) *Footsteps in the Sea: Christianity in Oceania to World War 11*, Institute of Pacific Studies, University of the South Pacific in association with World Council of Churches, Suva & Geneva.

Geomar International, (1997) *Solomon Islands: Final Evaluation of the Rural Training Centres Projects (7 ACP SOL 019)*, Draft Report, Project No 57505, ECU.

Gies (1982) *Defining Technology and Technological Education: A Crisis, or Cause for Celebration*?, In R. Hansen and M. Froelich (Eds). International Journal of Technology and Design Education, 4, Kluwer: Netherlands, 1994, pp179-207.

Ginns, I. S., McRobbie, C. J., and Stein, S. J. (2000) *Preservice Primary Teachers' Thinking About Technology and Technology Education*, International Journal of Technology and Design Education, 10 (1), Kluwer, Netherlands. pp 81-101.

Goetsch, D. L., and Nelson, J. A. (1987) *Technology and You*, Delmar Publishers Inc: USA.

Golby, M. (1989) Curriculum Traditions, In B. Moon, P. Murphy & J. Raynor (Eds), *'Policies for the Curriculum'*, Raynor, Hodders & Stoughton, London.

Goglin, I., and Swartz, E. (1992) *A Quantitaive and Qualitative Inquiry into the Attitudes towards Science of Nonscience College Students*, Journal of Research in Science Teaching, 29 (5), pp. 487-504.

Goodson, I. F. (1985a) *The Making of Curriculum: Collected Essay* , (2nd Ed), Studies in Curriculum History Series 21, Falmer Press, London.

Goodson, I. F. (1985b) Social Histories of the Secondary Curriculum. In I. F. Goodson (Ed), *Subjects for Study,* Falmer Press: Lewes, London.

Goodson, I. F. (1988) International Perspectives in Curriculum Development, London and New York: Routledge. In R. McComick, P. Murphy & M Harrison (Eds), Introduction: In *Teaching and Learning Technology*, The Open University, UK. 1993.

Goodson, I F. (1991) Teachers' lives and educational research. In I.F. Goodson & R. Walker (Eds) *Episodes in educational research*, Falmer Press: Lewes. pp

Gradwell, J. B. (1999) *The Immensity of Technology ... and the Role of the Individual*, International Journal of Technology and Design Education, 9 (3), Kluwer: Netherlands.

Grant, G. (1986) Technology and Justice, Anansi Press, Ontario. In Conway (Ed)*Values in Technology Education*, International Journal of Technology and Design Education 4, Kluwer: Netherlands. 1994. pp109-116.

Greaves, B. (1972) *Priorities in education in the South Pacific: The role of the secondary school in promoting technical education*, The University of the South Pacific, Suva.

Griffiths, F. D. (1975) Opening of the Industrial Arts Conference. In P. Q. Tukunia (Ed) *Industrial Arts Research and Development Board*, The University of the South Pacific, Suva, Fiji.

Groves, W. C. (1939) *Report on a survey of education in the British Solomon Islands Protectorate*, Education Department of Victoria: Australia.

Hacker. M., and Barden, R. A. (1989) *Technology Education.* Delmar Publisher, Inc: USA.

Hansen, K. H. (1995) *Reflection on Technology in Education: A Curriculum Model, Research and Development*, International Journal of Technology and Design Education, 5 (1), Kluwer: Netherlands, pp 35-50.

Hansen, R., and Froelich, M. (1994) *Defining Technology and Technological Education: A Crisis, or Cause for Celebration*, International Journal of Technology and Design Education, 4, Kluwer: Netherlands. pp 179-207.

Hardison, O. B. (1989) *Disappearing Through the Skylight: Culture and Technology in the Twentieth Century*, Viking Penguin: NY.

Harris, M. (1996) *New Zealand Parent's Guide To Primary School*, David Ling: Birkenhead, Auckland 10.

Hargreaves, A. (1989) *Curriculum and Assessment Reform*, Open University Press: Milton Keynes, UK.

Hass, G. (2000) Who should plan the curriculum, In F. W. Parkay and G. Hass (Eds) *Curriculum Planning: A contemporary Approach* (7th Ed) Allyn and Bacon: London.

Hawthorne, R. K. (1992) *Curriculum In The Making: Teacher Choice and the Classroom Experience*, Teachers College, Columbia University: NY.

Heil, J. (1983) *Perception and Cognition*, University of California Press: Berkley, Los Angeles, USA.

Hendley, D., and Lyle, S. (1996) *Pupils' Perceptions of Design and Technology: A case-study of pupils in South Wales*, Research in Science & Technological Education, 14 (2), Carfax: UK.

Hobbes, Locke and Humes (1995) In I. Rock (Ed), Perception, Scientific American Library, A Division of HPHLPP: NY.

Hodson, D. (1993) In Search of a Rationale for Multicultural Science Education, *Science Education.*

Hollway, W. and Jefferson, T (2000). *Doing Qualitative Research Differently: Free Association, Narrative and the Interview Method*, SAGE: London.

Honan, M., and Harcombe, D. (1997) *Solomon Islands*, Lonely Planet Publications: Hawthorn, Australia.

Hood, D. (1998) *Our Secondary Schools Don't Work Anymore: Why and how New Zealand Schooling must change for the 21st century*, Profile Books, Auckland: New Zealand.

Howard, A. (1970) *Learning to be Rotuman: Enculturation in the South Pacific*, Teachers College Press, Columbia University: NY.

Hviding, E. (1992) *Guardians of Marovo Lagoon: The Sea as Cultural and Relationship focus in New Georgia*, Solomon Islands Centre for Development Studies, University of Bergen, Norway.

Hviding, E. (1995a) *Vivinei Tuari pa Ulusaghe: Custom Stories of Marovo Area*, Centre for Development Studies, University of Bergen, Norway.

Hviding, E. (1995b) *Kilado oro Vivineidi Tongania ria Tingitonga pu ko pa Idere oro pa Goana pa Marovo of Reef and Forest: A Dictionary of Environmental and Resources of Marovo Lagoon*, CDS, UB, Norway in cooperation with Western Province Division of Culture, Gizo, Solomon Islands.

Hviding, E. (1996) *Guardians of Marovo Lagoon: Practice, Place and Politics in Maritime Melanesia*, (Pacific Islands Monograph Series 14), Center for Pacific Islands Studies, School of Hawaiian, Asian, and Pacific Studies, University of Hawai'i, University of Hawai'i Press, Honolulu, Hawai'i.

International Technology Education Association, (2000) *Standards for technological literacy: Content for study of technology*, ITEA: Virginia, USA. URL: http://www.iteawww.org

International Work Group for International Affairs, (1996) *The Indigenous World 1995-1996*, IWGIA: Copenhagen.

Institute of Pacific Studies, (1988) *Pacific Universities: Achievements, Problems and Prospects*; Institute of Pacific Studies, University of the South Pacific: Suva, Fiji.

Jack-Hinton, C. (1969) *The Search for The Islands of Solomon 1567-1983*, Clarendon Press, Oxford: UK.

Jaeger, R. M. (1997) *Complimentary Methods for Research in Education* (2nd Ed), American Educational Research in Education, Washington DC, USA.

Jarolimek, J., and Foster, C. D (1976) Modes of Teaching, In *Teaching and Learning in the Elementary School*, Macmillan: NY, USA.

Jarvis, T., and Rennie, L. J. (1996) *Understanding Technology: the development of a concept*, International Journal of Science Education, 18 (8), Taylor & Francis: London, UK. pp 977-992.

Jarvis, T., and Rennie, L. J. (1998) *Factors that influence children's developing perceptions of technology*, International Journal of Technology and Education, 8 (3), Kluwer: Netherlands. pp 261-279.

Jarvis, T., and Rennie, L. J. (1996) *Perceptions about technology held by primary teachers in Englan*d, Research in Science and technological education, 14 (1), pp43-54.

Jejede, O. J. (1997) *Traditional Cosmology and Collateral Learning in Non-Western Science Classrooms*, Research & Evaluation Unit, Distance Education Centre, University of Southern Queensland, Toowoomba, Australia.

Jejede, O. J., and Aikenhead, G. S. (1999) *Transcending Cultural Borders: Implications for Science Teaching*, Centre for Research in Distance & Adult Learning, The Open University of Hong Kong: Hong Kong.

Jejede, O.J, Aikenhead, G., and Cobern, B. (1996) *Cultural Studies in Science,* The Mito Document on Research Agenda: Mito, Japan.

Jones, A. (1999) *From Policy to Practice in Technology Curriculum Development: The Example of New Zealand*, Centre for Science, Mathematics and Technology Education Research, University of Waikato: Hamilton, New Zealand. pp 1-22.

Jones, A. (1997a) Technology Education in the New Zealand Curriculum, In Burns (Ed) *Technology in the New Zealand Curriculum: Perspectives on Practice*, The Dunmore Press, Palmerstone North: New Zealand.

Jones, A. (1997b) Recent Research in Learning of Technological Concepts and Processes, *International Journal of Technology and Design Education*, 7, 1-2, pp 83-96.

Jones, A. (1995) Technology Education in the New Zealand Curriculum:from policy to curriculum, *SAMEpapers 1995*, CSMTER, University of Waikato, Hamilton, New Zealand.

Jones, A. (2001) *Researching and enhancing teachers and student technological literacy*, National Association for Research in Science Teaching (NARST) Conference paper, USA.

Jones, A., and Carr, M. D. (1992) Teachers' Perceptions of Technology Education: Implications for Curriculum Innovation, *Research in Science Education,* 22, Australian Science Education Research Association, Australia. pp 230-239.

Jones, A., and Carr, M. D. (1993)Towards Technology Education: Volume 1:Working papers from the first phase of the learning in technology education project, *CSMTER*, University of Waikato: Hamilton, New Zealand.

Jones, A., and Carr, M. D. (1994) Student technological capability: Where do we start? *SAMEpapers* pp165-187. Hamilton, Centre for Science, Mathematics & Technology Education Research.

Jones, A., and Compton, V. (1998a) Reflecting on Teacher Development in Technology Education: Implications for Future Programmes, *International Journal of Technology and Design Education*, 8 (2), Kluwer: Netherlands. pp 151-166.

Jones, A., and Compton, V. (1998b) Towards a Model for Teacher Development in Technology Education: From Research to Practice, *International Journal of Technology and Design Education*, 8, Kluwer: Netherlands. pp 51-65.

Jones, R., and Pinheiro, L. (1997) *Fiji: a lonely plant travel survival kit*, Lonely Plant Publications, Hawthorn: Australia.

Joyce and Weil (1980) *Models of Teaching* (2nd Ed), Prentice-Hall, Inc: Englewood Cliffs.

Kant, I. (1995) In. I. Rock, *Perception*, Scientific American Library, A Division of HPHLP, NY, USA.

Kananoja, T. (1994) Technology Education in Nordic Countries, In D. Layton (Ed), *Innovations in Science and Technology*, 5, UNESCO: Vendome, France.

Kawagley, A. O. (1995) *A Yupiaq Worldview: A pathway to ecology and spirit*, Wavelength Press, Inc: USA.

Keats, D. M. (1993) *Skilled Interviewing* (2nd Ed), The Australian Council for Educational Research Ltd: Hawthorn, Victoria 3122, Australia.

Keesing, R. M. (1978) *ELOTA'S STORY: The Life and Times of a Solomon Island Big Man*, University of Queensland Press: Australia.

Keesing, R. M. (1992) *Custom and Confrontation: The Kwaio Struggle for Cultural Autonomy*, The University of Chicago Press: USA.

Kent, J. (1972) *The Islands Series: The Solomon Islands*, David and Charles: UK.

Kent, D., and Towse, P. (1997) Students' Perceptions of Science and Technology in Botswana and Lesotho, *Research in Science & Technological Education*, 15 (2), Carfax: UK. pp 161-172.

Kerre, B. W. (1994) *Technology Education in Africa,* In D. Layton (Ed) Innovations in Science and Technology, 5, UNESCO: Vendome, France.

Keesing, R. M., and Corrie, P. (1980) *Lightning Meets the West Wind: The Malaita Massacre*, Oxford University Press: UK.

Kidwood, T. M. (1977) Values in adolescent life: towards a critical description, In L. Cohen and L. Manion (Eds), *Research Methods in Education*, (4th Ed), Routledge: NY. 1998.

Ki'i, L. (1994) *Taking us to the present from pre-colonial to post-independence: Issues and problems pertinent to our education system*, Paper presented at an Education Summit held at Lelei Resort, Honiara, Solomon Islands. pp 1-19.

Kimball, S. T. (1970) In A. Howard (Ed) *Learning to be Rotuman: Enculturation in the South Pacific*, Teachers College Press: NY.

Kimbell, R. (1997) *Assessing Technology: International trends in Curriculum and Assessment: UK, Germany, USA, Taiwan, Australia*, Open University Press: Buckingham, UK.

Knox, M. (1997)*Voyage of Faith: The story of the first 100 years of Catholic Missionary Endeavour in Fiji and Rotuma*, Archdiocese of Suva: Fiji.

Krugly-Smolska, E. (1999) *Research on Multiculturalism Applied to Students' Learning School Science: Some Theoretical Issues*, Faculty of Education, Queen's University: Kingston, Ontario, Canada.

Kuschel, R. (1988) *Vengeance is the Reply: Blood Fewds and Homocides on Bellona Islands, Part 1 & Part 2*, Dansk Psykologist Forlag, University of Copenhagen, Denmark.

Labaree, D. F. (1998) Educational Researchers: Living with lesser form of knowledge, *Educational Researcher*, 27 (8), 4-12.

Lal, B. (1983) Girmitiyas: The Origins of the Fiji Indians, *The Journal of Pacific History*, Australian National University: Canberra.

Lane, N., Chisholm, M., and Mateer, C. (2000) *Techniques for Student Research: A Comprehensive Guide to Using the Library*, Neal-Schuman: New York, NY.

Laracy, H. (1983) Pacific Protest: The *Ma'asina Ruru Movement*, Institute of Pacific Studies (IPS), The University of the South Pacific, Suva, Fiji.

Laracy, H. (1989) *Ples Blong Iumi Solomon Islands: the past four thousand years*, IPS, USP, Fiji.

Lasaqa, I. (1984) *The Fijian people: Before and after independence 1959-1977*, Australian National University Press: Canberra.

Lather, P. (1992) *Critical Frames in Educational Research: Feminist and Poststructural Perspective: Theory into Practice*. 31 (2), pp 87-99.

Lawton, D. F. (1993) *National Curriculum in England: A Missed Opportunity*, paper presented at the 'Creating Our Future: A Curriculum for the 21st Century' Conference: Hobart, Australia.

Layton, D. (1993) Technology's Challenge to Science Education, *Developing Science and Technology Education,* Open University Press: Buckingham, UK.

Layton, D. (1994) *Innovations In Science And Technology Education,* 5, UNESCO: Vendome, Paris, France.

Levinson, R. Murphy, P. and McCormick, R. (1997) Science and Technology Concepts in a Design and Technology Project, *Research in Science and Technological Education,* 15 (2)., Open University, Milton Keyes, UK. pp 235-255.

Lewis, T. (1991) Introducing Technology into School Curriculum, *Journal of Curriculum Studies,* 23 (2). Taylor & Francis: London and Washington, D.C. pp141-154.

Lewis, T. (1995) From Manual Training to Technology Education: The Continuing Struggle to Establish a School Subject in the USA, *Journal of Curriculum Studies,* 27 (6). Taylor & Francis: London and Washington, D.C. pp621-645.

Lewis, T. (2000) *Technology Education and Developing Countrie*s, International Journal of Technology and Design Education, 10 (2), Kluwer: Netherlands. pp163-179.

Lewis, T., and Gagel, C. (1992) *Technological Literacy: A Critical Analysis*, Journal of Curriculum Studies, 24 (2), Taylor and Francis, London and Washington. D. C. pp 117-138.

Lewis-Jones Report, (1956) Legislative Council Paper No. 34 of 1955, Government of Fiji. In H. Tavola (Ed) *Secondary Education in Fiji: A Key to the Future*, Institute of Pacific Studies of the University of the South Pacific: Suva, Fiji.

Liligeto, A. G. (1984) *The needs assessment of technical education in the Solomon Islands*, The University of the South Pacific. (MA Thesis).

Lindblad. S (1990) *From Technology to Craft: On Teachers' Experimental Adoption of Technology as a new Subject in the Swedish Primary School*, Journal of Curriculum Studies, 22 (2), pp. 165-175.

Londono, E. A. A. (1994) *Technology education in Latin America*, In D. Layton (Ed) Innovation in science and technology education, 5, UNESCO: Vendome, France.

Lycos (2001) *Solomon Islands*, URL http//.www.lycos.com.

MacIvor, M. (1995) *Redefining Science Education for Aborigines Students*. In M. Battiste & J. Barman (Eds), First Nation Education in Canada: The Circle Unfolds. University of British Columbia Press: Vancouver, Canada.

Macneill, I. (2000) *Sweet Horizons: A history of the Solomon Islands*, Acland Press, St Kilda West: Australia 3182.

Maetia, A. (1996) *A Report on the visit to the Republic of China*, Ministry of Education & Human Resources Development: Honiara, Solomon Islands.

Mangubhai, F. (1984) 'Fiji' in Postlethwaite and Thomas. In H. Tavola (Ed) *Secondary Education in Fiji: A Key to the Future*, Institute of Pacific Studies, The University of the South Pacific: Suva, Fiji.

Mankato Technology Education Department, (1998) *Technology Education Student Program*, Mankato State University, MN 56002-8400.

Marsh, C. J. (1994) *Producing A National Curriculum: Plans and Paranoia*, Allen & Unwin: Sydney.

Martin, G. A. (1998) *Whose Image Is It Anyway? Some Consideration of the Curricular Importance of Subject Image in Secondary School Design and Technology Education*, Kluwer: Netherland. pp 37-49.

Martin-Kniep, G. O & Uhrmacher, P. B. (1992) *Teachers as Curriculum Developer*, Journal of Curriculum Studies, 4 (3), Taylor & Francis, London and Washington, D. C. pp 261-271.

Mather, V. J. (1995) *Students' Concepts of Technology and Technology Education: Implications for Practice*, University of Waikato, NZ. (MEd Thesis).

Mathieson, M., and Bernbaum, G. (1991) The British Diease: a British tradition?, In R. Moore and J. Ozga (Eds), *Curriculum Policy edited*, The Open University, Pergamon Press, NY. pp 55-63.

Mathews, C. E., and Smith, W. S. (1991) Indian-related Materials in Elementary Science Instruction. In G. S. Aikenhead (Ed) *Toward a First Nations Cross-Cultural Science and Technology Curriculum*, Culture and Comparative Studies, 81 (2), Wileys Publishers, USA.

Marx, K. (1867) Das Kapital, Volume 1, in: Marx/Engels: Werke, Volume 23, Dietz, Berlin 1959ff. In G. Ropohl (Ed) *Knowledge Type in Technology*, International Journal of Technology and Design Education, 7 (1-2). pp65-72.

May, T. (1996) *Social Research: Issues, Methods and Process*, Open University Press: Buckingham, UK.

Mayhew Report, (1938) *Education in the Colonial Empire*. London: Longmans, Green and Co. In H. Tavola (Ed) *Secondary Education in Fiji: A Key to the Future*, Institute of Pacific Studies, The University of the South Pacific: Suva, Fiji.

Maykut, P., and Morehouse, R. (1999) *Beginning Qualitative Research: A Philosophic and Practical Guide*, The Falmer Press: London.

McBurney, D. H. (2001) *Research Methods*, (5th Ed), Wadsworth/Thomas Learning, Belmont, USA.

McCormick, R. (1993a) Technology Education in the United Kingdom, In R. McCormick, P. Murphy and M. Harrison (Eds)*Teaching and Learning Technology* , Open University.

McCormick, R. (1993b) Technology Education proposals in the USA, In R. McCormick, P. Murphy and M. Harrison (Eds)*Teaching and Learning Technology*, Open University: London.

McCormick, R. (1993c) The coming of technology education in England and Wales. In F. Banks (Ed), *Teaching Technology*, Routledge: London.

McCormick, R. (1992) The Evolution of Current Practice in Technology Education, In R. McCormick, P. Murphy & M. Harrison (Eds) *Teaching and Learning Technology*, The Open University: UK.

McCormick, R., Murphy, P., and Harrison, M. (1992) *Teaching and Learning Technology*, Addison-Wilson Publishing Company, The Open University: England.

McCoy, M. (1999) *Solomon Islands*, Orbit Global Travel Guide, URL:http/www.Lycos.com.

McCulloch, G. (1992) *The School Curriculum in New Zealand: History, Theory, Policy and Practice*, The Dunmore Press, New Zealand.

McDonald, H. and Ingvarson, L. (1997) *Technology: A Catalyst for Educational Change*, Journal of Curriculum Studies, 29 (5) pp 513-527.

McGee, C. (1997) *Teachers and Curriculum Decision-Making*, The Dunmore Press: Palmerstone North, Wellington, New Zealand.

McGinn, E. R., (1978) What is technology? In Durbin P.T (Ed), *Research in Philosophy and Technology*, 1, JAI Press: Greenwich, Connecticut.

McKinley, E. (1996)*Towards an Indigenous Science Curriculum.* Research in Science Education 26.

McKinley, E. (1997) *Whose Knowledge? In Search of Postcolonial Curricula*, CSMTER, University of Waikato, New Zealand.

Mesthene, E. G. (1970) Technological Change: Its Impact on Man and Society. In R. Hansen & M. Froelich (Eds), *Defining Technology and Technological Education: A Crisis, or Cause for Celebration?,* International Journal of Technology and Design Education 4, Kluwer: Netherlands. 1994. pp179-207.

Michie, M. (1998) *Crossing Borders: Understanding Differing Worldviews of Science through the Northern Territory Science Curriculum*, Northern Territory Department of Education, Darwin. Proceedings of the Australian Joint Regional Conference of GASAT and IOSTE (ed. J E Goodwell), pp441-448.

Michie, M., and Linkson, (1999). *Interfacing Western Science and Indigenous Knowledge: A Northern Territory Perspective*, Northern Territory Department of Education, Darwin. Paper presented at the 30th Australasian Science Education Research Association Conference, held at Rotorua, Aotearoa, New Zealand. pp1-13.

Michie, M., Anlezark, J. and Uibo, D. (1998)*Beyond Bush Tucker: Implementing Indigenous Perspectives Through the Science Curriculum*, Northern Territory Department of Education, Darwin NT 0801. Paper presented at the 47th Annual Conference of the Australian Science Teachers Association (CONASTA 47), Darwin NT, pp 1-7.

Miller, G. and Dingwall, R. (1997) *Context & Method in Qualitative Research*, SAGE, London.

Ministry of Education, (1995) *Technology in the New Zealand Curriculum*, Learning Media: Wellington, New Zealand.

Ministry of Education and Technology, (1998) *Annual Report for the Year 1997*, Parliament of Fiji, Parliament Paper No. 12 of 1998.

Ministry of Education and Technology, (1998) *Education Fiji 2020* (Draft), Education Plan Division: Suva, Fiji.

Ministry of Finance, (1996) *Statistical Bulletin No.03/96: Education Statistics 1995*, Statistics Office, Ministry of Finance, Honiara, Solomon Islands.

Mitcham, C. (1994) *Thinking Through Technology*, Chapter 10. Chicago, University of Illinois Press. USA.

Mitcham, C. (1980) Philosophy of Technology. In R. Hansen & M. Froelich (Eds), *Defining Technology and Technological Education: A Crisis, or Cause for Celebration?,* International Journal of Technology and Design Education 4, Kluwer Academic Publishers, Netherlands. 1994. pp179-207.

Monberg, T. (1996) *The Religion of Bellona Islands: A study of the Place of Beliefs and Rites in the Social Life of Pre-Christian Bellona, Part 1 & Part 2*, The National Museum of Denmark, Copenhagen.

Moon, B. (1991) *A Guide to the National Curriculum*, Oxford University Press, Walton Street, Oxford.

Morris, L. L., Fitz-Gibbon, and Freeman, M. E. (1978) *How to Communicate Evaluation Findings*, Center for the Study of Evaluation, SAGE: London.

Morke Report, (1965) *United Nation Development Programme Assistance*, International Labour Organization, Geneva.

Morgan, K. (1994a) *Technology Education in Australia and South-East Asia*, In Layton (ed) Innovations in Science and Technology, 5, UNESCO: Vendome, France, 1994.

Morgan, K. (1994b) *Technological Literacy*, Keynote presentation to the biennial conference of the Australian Council for Education through technology, Hobart, Tasmania, Australia. pp 114.

Mosothwane, M. (1995) *The Study of Curriculum Change in Botswana and Special Reference to Primary Science: An historical perspective*, Curriculum Studies: A Journal of Educational Discussion and Debate, 3 (1), Triangle Journal Ltd, UK. pp 79-89.

Naughton, J. (1992) *What Is Technology?* In R. McComick, C. Newey & J. Sparkes (Eds) Technology for Technology Education, The Open University, UK.

Naughton, J. (1986) What Is "Technology" Anyway? In R. Hansen and M. Froelich (Eds), *Defining Teaching and Technical Education: A Crisis, or Cause for Celebration*, International Journal of Technology and Design Education, Volume, Kluwer: Netherland, 1994. pp179-207.

Nayacakalou, R. R. (1978) *Tradition and Change in the Fijian Village*, Institute of Pacific Studies, USP, Suva.

Nelson, C., Treichler, P. A., & Grossberg, L. (1992) Cultural Studies. In N. K Denzin and Y. S. Lincoln (Eds), *Handbook of Qualitative Research*, SAGE Publications, International Educational and Professional Publisher: Thousand Oaks, USA.

Nelson-Barbour, S., and Estrin, E. T. (1995) Culturally responsive mathematics and science education for Native Students: Far West Laboratory for Education Research and Development. In G. S. Aikenhead (Ed) *Toward a First Nations Cross-Cultural Science and Technology Education*, Culture and Comparative Studies, 81 (2), Wileys Publishers, April 1997. pp. 217-238.

Newmann, F. M. (1990) *Higher Order Thinking in Social Studies*, Journal of Curriculum Studies, 22 (1), pp. 41-56.

New Zealand Ministry of Education, (1996) *Te Whariki*, Learning and Media Ltd, Wellington, NZ.

Norrekit, L. (1973) *Concepts: Their nature and significance for metaphysics and epistemology*, Odense, Odense Universitetsforlag. Norway.

O'Brien, C. (1995) *A Greater Than Solomon Here: A story of Catholic Church in Solomon Islands*, Catholic Church Solomon Islands, Honiara.

O'Conner, J. R. (1988) *National Curriculum Statement: A Discussion Document for Primary and Secondary Schools,* (Draft) Department of Education: Wellington. New Zealand.

Ogunniya, M. B. (1999) *Science Education in a Multi-cultural South Africa*, School of Science and Maths Education, University of the Western Cape, Bellville, South Africa.

Ogunniyi, M. B., Jejede, O. J., Ogawa, M., Yandila, C. D., and Oladede, F. K. (1995) *Nature of Worldview presuppositions among science teachers in Botswana, Indonesia, Japan, Nigeria, and the Philippines*, Journal of Research in Science Teaching, 32 (8), pp. 817-831.

O'Hear, P., and White, J. (1993) *Assessing the National Curriculum*, Paul Chapman Publishing Ltd, London.

Oliver, D. L. (1989) *The Pacific Islands* (3rd Ed), University of Hawai'I Press, Honolulu.

O'Rourke, M. (1993) *The New Zealand Curriculum Framework:* Te Anga Marautanga o Aotearoa, Ministry of Education: Wellington, NZ.

Osborne, R. & Freyberg, P. (1997) *Learning in Science: The Implications of Children's Science*, Heinemann: Auckland.

O'Sullivan, M. M. Y. L (1992). *The Developmental Fijian State and Politics of Development*, University of Hawai'i, UMI Dissertation Service, A Bell and Howell Company, University Microfilm International, USA (PhD Thesis).

Packman, J. (1996) *Technology Education: Implications for the New Zealand Curriculum*, SAMEpapers, Science and Maths Education Papers, University of Waikato: Hamilton, New Zealand. pp 18-28.

Paechter, C. (1991) *Subcultural Retreat: Negotiating the design and technology curriculum*. Paper presented to the British Educational Research Association Annual Conference 1991.

Patton, M. Q. (1990) Qualitative Evaluation Methods, (2nd Ed), Beverly Hill, CA: Sage. In P. Maykut and Morehouse (Eds), *Beginning Qualitative Research: A Philosophic and Practical Guide*, Falmer Press, Taylor & Francis Group, London.

Petrina, S. (1998) *Multidisciplinary Technology Education,* International Journal of Technology and Design Education 8, Kluwer: Netherland. pp103-138.

Petrina, S. (2000) *The Political Ecology of Design and Technology Education: An Inquiry into Methods*, International Journal of Technology and Design Education, 10 (3), Kluwer: Netherlands. pp207-237.

Pigdon, K., and Woolley, M. (1992) *The BIG Picture: Intergrating Children Learning*, Eleanor Curtain: NY.

Pomeroy, D. (1994) *Science Education and Cultural Diversity: Mapping the Field,* Studies in Science Education.

Portelli, J. P. (1993) *Exposing the Hidden Curriculum*, Journal of Curriculum Studies, 25 (4), pp. 343-358.

Postman, N. (1992) Technopoly: The Surrender of Culture to Technology. In R. Hansen and M. Froelich (Eds) *Defining Technology and Technological Education: A Crisis, or Cause for Celebration?*, International Journal of Technology and Design Education, 4 (2), Kluwer: Netherland. 1994. pp. 179-207.

Prime, G. M. (1993) Approaches to Learning In R. Conway (Ed) *Values in Technology Design*, International Journal of Technology and Design Education, 4, Kluwer: Netherlands. pp 109-116.

Pytlik, E. C., Lauda, D. P., and Johnson, D. L. (1985) Technology, Change and Society, Davis Publishers, Worcester. In R. Hansen and M. Froelich (Eds), *Defining Technology and Technological Education: A Crisis, or Cause for Celebration?,* International Journal of Technology and Design Education 4, Kluwer: Netherlands 1994. pp179-207.

Quicke, J. (1999) *A Curriculum for Life: Schools for a Democratic Learning Society*, Open University, Buckingham, Great Britain.

Raat, J., De Klerk Wolters, F. and de Vries, M. J. (1987) *Report: PATT Conference 1987*: 1, Proceedings, Eindhoven University, The Netherlands.

Ramsay, P. Harold, B. Hill, D. Lang, C and Yates, R. (1997) *A Model for School-Based Curriculum Development*, Teacher and Curriculum, 1, School of Education, University of Waikato, Hamilton, New Zealand.

Rakow, S. J., and Bermudez, A. B. (1993) Science is "Ciencia: Meeting the Needs of Hispani Students. Science Education. In G. S Aikenhead (Ed) *Toward a First Nations Cross-Cultural Science and Technology*, Culture and Comparative Studies, 81 (2), Wileys Publishers, April 1997. pp. 217-238.

Ravuvu, .A. (1983) *Vaka i Taukei: The Fijian Way of Life*, Institute of Pacific Studies of the University of the South Pacific, Suva, Fiji.

Ravuvu, A. (1991) *The Facade of Democracy: Fijian struggles for Political Control 1830-1987*, Reader Publishing House, 2nd Floor, Procera House, Suva, Fiji.

Reed, A. W., and Hames, I. (1967) *Myths & Legends of Fiji & Rotuma*, (Student Edition), Reed Books (NZ) Ltd, Auckland.

Rennie, L. J. (1987) *Teachers' and pupils perceptions of technology and the implications for curriculum.*, Research in Science and Technological Education, 5 (2), pp121-133.

Rennie, L. J., and Jarvis, T. (1995a) *English and Australian children's perceptions about technology*, Research in science and technological education, 13 (1), pp37-52.

Rennie, L. J., and Jarvis, T. (1995b) *Three approaches to measuring children's perceptions about technology*, International Journal of Science Education, 17 (6). pp755-774.

Rensburg, S. V., Ankiewicz, P., and Myburgh, C. (1999) *Assessing South Africa Learner' Attitude towards technology by using the PATT (Pupils' Attitudes Towards Technology) Questionnaire*, International Journal of Technology and Design Education, 9 (2), Kluwer Academic Publisher, Netherlands. pp 137-151.

Resnick, L. B., (1991) Shared Cognition: Thinking as Social Practice, In Resnick L. B., Levine J. M and Teasley S. D (Eds), Perspectives on Socially Shared Cognition, American Psychological Association and in CSMTER Technology Education 0781.511 (C&Y) Readings for Module 2, *Learning in Technology Education*, University of Waikato, Hamilton, New Zealand.

Rock, I. (1995) *Perception*, Scientific American Library, NY.

Rock, I. (1975) *An Introduction to Perception*, Macmillan: NY, USA.

Roth, G. K. (1953) *Fijian Way of Life*, Oxford University Press: London.

Rowling, R. (2000) *The Creative Guide to Research: How to find what you need...* Online or Office, Career Press, Franklin Lakes, NJ, USA.

Rowse, T. (1993) *After Mabo: Interpreting Indigenous traditions,* Melbourne University Press, Australia.

Ruddock, R. (1981) *Evaluation: A consideration of Principles and Methods,* MANCHESTER MONOGRAPHS 18, Direct Design (Bournemouth) Ltd. Printers, Sturmister Newton, Dorset.

Saemala, F. J. (1979) *Our Independent Solomon Islands*, The Institute of Pacific Studies and the Solomon Islands USP Centre, The University of the South Pacific, Suva, Fiji.

Salomon, O (1994) Technology Education in the Nordic Countries. In D. Layton (Ed) *Innovations in Science and Technology Education*, 5, UNESCO: Paris, Vendome, France.

Saunana. J. (1978) Education Act 1978. In Solomon Islands Teachers College (SITC 1981) *The Development of Education in the Solomon Islands, Diploma in Education: Unit 1.01 – Part D & E*, Department of Education, Solomon Islands Teachers College, Honiara, Solomon Islands.

Scarr, D. (1984) *Fiji: A Short History*, Allen & Unwin: North Sydney, NSW.

Schneider, D. J., Hastorf, A. H., and Ellsworth, P. C. (1979) *Person Perception*, Addison-Wesley: Reading, Massachusetts, USA.

Searle, I. (1970) *Education in the BSIP: History and Structure*, Guadalcanal, Honiara, British Solomon Training College.

Seashores, C. (1924) Introduction to Psychology, Macmillan. In S.H. Bartley (Ed), *Principles of Perception*, Harpers & Row: NY.

Selinger, B (1998) *Chemistry in the Marketplace* (5th Edition), Harcourt Brace & Company: Australia.

Scriven (1985) Appendix to a report on Education and Technology in Western Australia: the Concepts of Technology and of Education for Technology. In L. J. Rennie (Ed) *Teachers' Pupils' Perceptions of Technology and Implications for Curriculum*, Research in Science and Technological Education, 5 (2), 1987. pp 121-133.

Sharma, A. N. (1989) *Multicraft in Fiji Secondary Schools: An evaluation of a Non-formal Education Programme*, USP, Fiji. (MA Thesis).

Sharma, A. N. (1995) *Management of the Vocational Education and Training Programme (VETP) in Fijian Secondary School*, Bristol, UK. (PhD Thesis).

Shayer, M. and Adey, P. (1981) Towards of Science and Science Teaching. London, Heinemann. In R. Osborne and P. Freyberg, (Eds.), *Learning in Science: Implications of Children's Science*, Heinemann, Auckland.

Shield, G. (1996) *Formative Influences on Technology Education: The Search for an Effective Compromise in Curriculum Innovation*, Journal of Technology Education, 8 (1).

Shipman, M. (1979) Heinemann Organisation in Schools Series *In-School Evaluation*, Heinemann Educational Book: London.

SINURP, (1994) *Policies, Strategies and Programme of Action 1995-1998, Solomon Islands National Unity Reconciliation and Progressive Pati (SINURP) Government Development Framework*, Solomon Islands Government, Honiara.

Smith, L. (1991) *The National Curriculum of New Zealand: A discussion Document*, Ministry of Education, Learning Media: Wellington, New Zealand.

Smith, L. T. (1992) Kura Kaupapa Maori and the Implications for Curriculum, In G. McCulloch (Ed), *The School Curriculum in New Zealand: History, Theory, Policy and Practice*,The Dunmore Press, New Zealand.

Smith, L. T. (1999) *Decolonizing Methodologies: Research and indigenous people*, Zed Books Ltd, University of Otago Press., New Zealand.

Smith, L. (1993) *Education for the 21st Century: A Discussion Document*, Ministry of Education, Learning Mediua: Wellington. NZ.

Solomon Islands Teachers College (1981) *The Development of Education in the Solomon Islands, Diploma in Education: Unit 1.01-Part D & E*, Department of Education, Solomon Islands Teachers College (SITC): Honiara, Solomon Islands.

Sparkes, J. (1992) *Some Diffrences Between Science and Technology*, In R. McCormick, C. Newey & J. Sparkes (Eds) Technology for Technology Education, Open University: UK.

Steley, D. (1989) *The Seventh-day Adventist Mission in the South Pacific excluding Papua New Guinea*, 1886-1986, University of Auckland. (PhD Thesis).

Stephens Report, (1946) Opening of the Industrial Arts Teachers Conference. In P. Q. Tukunia (Ed) *Industrial Arts Research and Development Board*, The University of the South Pacific, Suva, Fiji.

Stevenson, A. (1988) Solomon Islands: *An Official Publication of the Solomon Islands Tourist Authority*, Lahood: Newmarket, Auckland, New Zealand.

Stewart, I. D. (1975) Opening of the Industrial Arts Teachers Conference. In P. Q. Tukunia (Ed), *Industrial Arts Research and Development Board*, The University of the South Pacific: Suva, Fiji.

Stone, A. R. (1996) *The War of Desire and Technology at the Close of the Mechanical Age*, The MIT Press: Cambridge, Massachusetts, England.

Stufflebeam, et al. (1971) Educational Evaluation and Decision Making. In S. Kemmis and R. Stake (Eds), *Evaluating Curriculum*, Deakin University, 1988.

Swernofsky, N. (1989a) *Making Technology Work*, Delmar: Albany, NY.

Swernofsky, N. (1989b) *The transition from Industrial Arts to Technology Education*, in Making Technology Works, Delmar: USA.

Swernofsky, N. (1989c) *Developing a Working Philosophy towards Technology Education*, in Making Technology Works, Delmar: USA.

Symington, D. J. (1987) *Technology in the primary school curriculum: teacher ideas*, Research in Science and Technological Education, 5 (2), pp167-172.

Tanner, L. N. (1991)*The Meaning of Curriculum in Dewey's Laboratory School (1896 - 1904)*, Journal of Curriculum Studies, 23 (2), March and April.pp101 117.

Tetaga, J. E. (1995) *Technology: Curriculum Statement for Grades 11-12 in Papua New Guinea*, Draft for discussion, Department of Education, Curriculum Unit, Waigani, PNG.

Tavola, H. (1991) *Secondary Education in Fiji: A key to the future*, Institute of Pacific Studies of the University of the South Pacific: Suva, Fiji.

Thaman, K. H. (1985) *Curriculum development issues in Pacific Island countries with specific reference to Tonga*, Commonwealth Experts Meeting on educational development for smaller states of the Commonwealth, Mauritius.

The Concise Oxford Dictionary (1991), (8th Ed), Claredon Press, Oxford.

The International Work Group for Indigenous Affairs, 1995-1996 (1996) *The Indigenous People 1995-1996*, IWGIA, Eks-Skolens Trykkeri, Copenhagen.

The Solomon Star, (2000) *Review of the Education System in the Solomon Islands*, The Solomon Star, Newspaper, Issue No. 1593, Friday, 14th April, 2000, p5.

Thornley, A., and Vulaono, T. (1996) *Mai Kea Ki Vei? Stories of Methodism in Fiji and Rotuma*, Methodist Church in Fiji.

Tippett, A. R. (1967) *Solomon Islands Christianity: A Study in Growth and Obstruction*, Lutterworth Press: London.

Tobin, K. (2000) Interpretive Research in Science Education. In A. E. Kelly and R. A. Lesh (Eds) *Handbook of Reserch Design in Mathematics and Science Education*, Lawrence Erlbaum Associates: Mahwah, USA.

Toren, C. (1990) *Making Sense of Hierarchy: Cognition as Social Process in Fiji*, The Athlone Press, London.

Treadaway, J. (1996) *Secondary Curriculum Development Policy Assignment Report*, Third education and training project IDA Credit No. 2500-SOL, Solomon Islands Government: Honiara.

Tuckman, B. W. (1972) *Conducting Educational Research* , Harcourt Brace Jovanovich, NY. In L. Cohen and L. Manion, (1997) Research Method in Education, (4th Ed), Routledge, NY.

Tukunia, P. Q. (1975) Opening of the Industrial Arts Teachers Conference. In P. Q. Tukunia (Ed), *Industrial Arts Research and Development Board*, The University of the South Pacific: Suva, Fiji.

Uluicicia, M. (1998) *Education Report to the 13th Methodist Conference*, Methodist Church in Fiji, Rotuma and Rabi, Epworth House, Suva, Fiji.

Urdang, L. (1997) *Oxford Compact Thesaurus*, Oxford University Press, Great Britain.

Volk, K. S. (1996) *Industrial Arts Revisited: An Examination of the Subject's Continued Strength, Relevance and Value*, Journal of Technology Education, 8 (1). pp1-9.

Volk, K. S., and Ming, Y. W. (1999) *Gender and technology in Hong Kong: A study of pupils' attitudes towards technology*, International Journal of Technology and Design Education, 9 (1), Kluwer: Netherlands. pp 57-71.

Waetjen, W. B. (1987) The Atonomy of Technology: A Challenge to Education, The Technology Teacher, 46 (6), pp7-14. In R. Hansen & M. Froelich (Eds) *Defining Technology and Technological Education: A Crisis, or Cause for Celebration?,* International Journal of Technology and Design Education 4, Kluwer: Netherlands, 1994. pp179-207.

Walter, G. I. (1930) *The Island Builders of the Pacific*, Seeley, Service & Co. London.

Wan. K. K. (2000) *Curriculum Framework: Technology URLhtt//www. Education Key Learning* (wankk@alumni.cuhk.edu.hk) *Area*, (Draft), Hong Kong. pp1-18.

Weintraub, D. J. and Walker, E. L. (1968) *Perception, Basic Concepts in Psychology Series*, Brooks/Cole: Belmont, California, USA.

Wiseman, S., and Pidgeon, D. (1970) *Exploring Education Curriculum Evaluation*, National Foundation for Educational Research in England and Wales, The Mere, Upton Park, Slough, Bucks, London, UK.

Wicklein, R. C. (1997) *Curriculum Focus for Technology Education*, Journal of Technology Education, 8 (2), Spring 1997.

Wittrock, M. C. (1974) Learning as a generative process, Educational Psychology. In R. Osborne and P. Freyberg, (Eds.) *Learning in Science: Implications of Children's Science*, Heinemann, Auckland.

Woods, P. (1993) *Critical Events in Teaching and Learning*, Falmer: London.

World Bank, (1993a) *Pacific Regional Post Education Study*, Volume 5: Solomon Islands, Population and Human Resource Division, East Asia and Pacific Regional Office, Country Department III in cooperation with Australian International Development Agency Bureau and Overseas Development Agency (UK).

World Bank, (1993b) *Staff Appraisal Report Solomon Islands Third Education and Training Project*, Report No. 11566-SOL, Population and Human Resources Operations Division, Country Department III, East Asia and Pacific Region.

Wright, R. T. (1992) *Building a Defensible Curriculum Base*, Journal of Technology Education, 1 (1), pp34-58.

Young, B. (August, 1992) *Science and Technology Education: The Response of the Aid Doner. Science, Technology & Development*, Journal of the Third World Science, Technology & Development Forum, 10 (2), Frank Case, London.

Zindel, H. (1999) *Development of a PSSC Technology Course, South Pacific Board for Assessment*, Government Building, Suva, Fiji.