

TECHNOLOGY EDUCATION TEACHER DEVELOPMENT IN SOLOMON ISLANDS: ENHANCING TEACHERS' PERCEPTIONS AND CLASSROOM PRACTICES

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ABSTRACT

Technology education in the Solomon Islands is in the process of change with the curriculum being developed into a more broad technological literacy approach, comprising of technological knowledge, technological practices, and the nature of technology. This paper is based on a two-year study (2005 and 2006) with 8 secondary technology education teachers in the Solomon Islands. The first year of the research revealed that technology teachers in the Solomon Islands held narrow perspectives of technology and technology education, with views centring on narrow technical aspects. Classroom practices were teacher-dominated and authoritarian. Most teaching approaches included rote learning. A professional development programme based on the principles of teacher reflection, teacher support, and on-going professional development was undertaken. Workshop days were interspersed with classroom practice. The programme focussed on developing teachers' views of the nature of technology and learning in technology education, assisting teachers in planning for effective technology teaching and introducing the concept of assessment for effective technology learning. It impacted on teachers' perceptions and classroom practices. Changes included the teachers' perceptions of technology and technology education, the teachers' teaching documents, the teaching pedagogy, the teachers' assessment practices and the students' learning styles.

1. INTRODUCTION

This paper is based on a two-year study (2005 and 2006) undertaken with 8 secondary technology education teachers in Honiara, the capital of Solomon Islands. The Solomon Islands is a small island nation in the Pacific region, which consists of six major islands and approximately 992 smaller islands, atolls and reefs, stretching over approximately 1,500 square kilometres, with a land area of some 28,369 square kilometres (Honan & Harcombe, 1997). The population of the Solomon Islands is about 450,000 which predominantly Melanesians with a small margin of Polynesians and Micronesians, and a few others. Honiara, the capital of the Solomon Islands, is located on the main island of Guadalcanal province, which is the centre for the Government and commerce.

The Curriculum Centre at the Ministry of Education in the Solomon Islands has undertaken a two years (2004 -2005) major curriculum reform, which prompted the curriculum developers to instigate some significant changes to the secondary school syllabuses in the Solomon Islands. Consequently, a new curriculum which is now known

as Technology was developed, and has taken into account a more broad technological literacy approach, comprising of technological knowledge, technological practices, and the nature of technology. These new changes have created a timely opportunity for this research to be undertaken in the Solomon Islands.

The research objectives are focused on the following two questions; (1) what are the technology education teachers' existing views of technology and technology education, and their current classroom practices? (2) What effect does the professional development programme have on teachers' concepts of technology and technology education, and teachers' classroom practices? A preliminary investigation was conducted in 2005, on the teachers' existing perceptions of technology and technology education, and classroom practices. Based on the findings of the preliminary inquiry, a teacher professional development programme was developed. The teacher development intervention programme was then delivered in 2006, together with an investigation on the effect of the teacher development programme on teachers' perceptions of technology and technology education, and teachers' classroom practices. The findings of this research are discussed next.

2. DISCUSSION

2.1. The Teachers' Perceptions of Technology: 2005 Findings

Discussed in this section are the two main views indicated by the teachers in regard to what they perceived to be technology. The two main views revealed from the preliminary inquiry in 2005 are outlined as; (1) technology as artefacts, and (2) technology as making something. The details are discussed below in turn.

2.1.1. Technology as artefacts

The teachers who held this perception of technology as artefacts talked about technology as new things and foreign things, which have no origin in the Solomon Islands. As Gilson explained:

"When I think of the word technology I think of the new things that we have in our time today... like the cars on the road used for transportation is technology, because we don't have them before and they are new to us".

Another teacher, Jason also acknowledged foreign artefacts as technology while trying to explain that indigenous artefacts could also be considered as technology. He said:

"Before I see technology as something foreign but now I tend to see that it can also be the things that are done and made within our own country basically to improve the quality of our life".

The Solomon Islands is a developing country, and many new artefacts with foreign origins were imported into the country, and undoubtedly, they do have some bearings in influencing the teachers' perceptions on what they considered to be technology.

2.1.2. Technology as making something

The teachers who perceived technology as making something, made specific references to school related activities such as building constructions, making furniture and other construction related activities done at schools. For example, Timmy talked about the kinds of things made at school as technology; "technology is about the kind of things that we do at schools, like building of houses, and doing technical drawings etc". Another teacher, Anthony pointed out the hands-on related activities done in the kindergarten schools as technology. He said; "in the kindergartens, a child doing technology when they are building playhouses, building bridges and so forth". Other hands-on related activities like making chairs both at schools and outside of school were also seen as technology, as Ronald pointed out; "when I think of technology, I think of how we make

things like the chairs that we make at school, and those that are made outside of schools". Most examples on technology as making something were referenced to the school-based tasks as teachers talked about the kinds of construction related activities the students got to do at schools.

2.2. Teachers' Perceptions of Technology Education: 2005 Findings

This section discussed the main views indicated by teachers as they talked about technology education. The two main views revealed from the preliminary inquiry in 2005 are outlined as; (1) technology education as hands-on activities and (2) technology education as creativity and innovation. The details are discussed next in turn.

2.2.1. Technology education as hands on activities

Technology education as hands-on activities is a common view shared by many participating teachers. The teachers who held this view talked about technology education in terms of learning to do things by hand, practical and manual education, and learning about trade skills. For example, Raymond commented that, "technology education is a formal way of teaching students to make things with their own hands". Doing things by hands was perceived by Gilson as "practical or manual education". Hence, by undertaking such education in schools, students would be better prepared for a future career in trades. As Zebedee stated; "Technology education is about teaching students how to do designing and construction of something in schools and to prepare them for trade work". Timmy made a specific reference to the kinds of skills required for modern trades. As he explained; "technology education is learning about modern trades that we have today in society, like learning the skills to build modern houses". The view of technology education as hands-on activities was focused mainly on the technical aspects of technology education.

2.2.2. Technology Education as Innovation and Creativity

The teachers who held this view on technology education made references to the notion of making new things as being innovative and creative. The teachers talked about technology education as learning to be innovative by putting new ideas into making new products. For example, Anthony stated that, "technology education is about learning how to make new things, such as putting new ideas into making new products". Another teacher, Jason talked about the significance of creativity as a pedagogical approach for teaching and learning in technology education.

"Technology education is about educating students to become creative. Rather than just depending on the teachers for teaching them every thing, the students have to learn to be creative in doing things. So technology education is all about encouraging students to be creative in their class activities".

Technology education is perceived as a subject with a pedagogical approach that involved students in undertaking innovative and creative classroom activities.

2.3. The Teachers' Classroom Practices in Technology Education: 2005 Findings

The discussion on teachers' classroom practices is based on the teachers teaching documents and classroom observations in 2005. This discussion is focused mainly on 4 themes, such as; (1) the fragmented teaching of theoretical and practical lessons, (2) the predominantly prescribed teaching documents, (3) the closed tasks teaching approaches, and (4) the teachers' assessment practices.

2.3.1. The fragmented teaching of theoretical and practical lessons

The teachers' theoretical and practical lessons seem to be fragmented, as most theoretical lessons were taught separately from the practical lessons. In most cases, the timing of the theoretical lessons did not match the timing of the practical lessons. In other cases, the theoretical and practical lessons had no links. For example, Zebedee taught a theoretical lesson on plywood and a practical lesson on how to make a rebate joint using solid wood. The teaching of unrelated theoretical and practical lessons in technology education was common with many of these teachers in Solomon Islands.

2.3.2. The predominantly prescribed teaching documents

The teachers' teaching documents were predominantly prescribed, as most teaching lessons were based on the Ministry of Education produced textbooks. The textbooks were used as recipe books, and the teachers' lessons were taught exactly as the textbooks prescribed. These textbooks are content based with no clear outlined learning outcomes. The textbooks mainly contained notes on either a process involved in manufacturing of a product or working procedures for acquiring technical skills. Therefore, the teachers' key emphasis of the teaching lessons was more procedural focused.

2.3.3. The closed task teaching approaches

The teachers' classroom tasks, both practical and theoretical lessons were mainly closed tasks, and were also confined to the prescribed textbooks or individual teachers' prescribed lessons, with a step by step to follow in undertaking the tasks. As all students followed the same step by step outlined procedures, the students' finished projects looked exactly the same. By undertaking closed tasks, the teachers' teaching approaches seem to be more authoritative, as the focus was mainly on the narrow technical aspect of technology education. Hence, the teachers' teaching approaches seem to be teacher dominated, as most teaching and learning approaches were textbook oriented, and mostly confined to classroom settings.

2.3.4 The Teachers' Assessment Practices

The teachers' formative assessment practices were often one-sided as teachers seem to do most of the talking. In other words, when teachers interacted with students through questioning, often the students were not given enough time to respond. Frequently, most of the students' responses seem to be limited to a one right answer, as the teachers' questioning techniques were restricted only to tell the teacher type questionings. The teachers' summative assessment practices were limited only to written tests and skilled based assessment on students' practical tasks.

2.4. Teacher Professional Development

Due to the geographical setting of the Solomon Islands, with many scattered islands and great isolation, a centralised and dissemination approach is the usual approach to teacher professional development in the Solomon Islands. Bell (1993) points out, that a meaningful change does not normally occur with the dissemination approach model of professional development, but rather a professional development model which based on interaction and collaboration approach. This model was found to be more effective and brought about meaningful changes in teaching practice in a lasting way (Bell, 1993). The professional development programme adopted for this research was based on the interaction and collaboration model, taking into account the personal, social, and professional needs of teachers by providing an on-going professional development, teacher supports and feedbacks, and teacher reflections (Bell & Gilbert, 1996).

2.4.1. An On-Going Professional Development

It is essential for teacher development to be on going. Jones (2003) emphasises that a long-term teacher development, which is based on an ongoing process is vitally crucial for effecting change in a classroom practice (see also Jones & Compton, 1998; Bell, 1993; Bell, 2005). The long-term on-going professional development in technology education in New Zealand has enabled technology education teachers to have a much

broader view of technology and technology education consistency with the technology curriculum (Jones, 2003). The professional development in the Solomon Islands was designed with the Workshop days interspersed with classroom practice as seen in figure 1: Professional development programme overview.

Workshop 1 Two Days	Classroom Practice 6 weeks	Workshop 2 One Day	Classroom Practice 6 weeks	Workshop 3 Half a Day
Developing Technological Concepts & Planning Units Lessons	Trialing Units with the facilitator	Reflection & Assessment for Effective Learning	Trialing Continued with the facilitator	Reflection on the Professional Development programme

Figure 1: Professional development programme overview

The professional development overview depicts the nature of an on-going professional development programme which created a culture of teacher development that saw continual professional growth and change as mostly important for effective teaching practice. As Richard commented:

“It’s also good that we can have another workshop coming up so that we can be able to expand more on our views of technology and learn more to help us with our teaching of technology. I’m always looking forward to those workshops”.

2.4.2. Teacher Reflection

Through out the professional development programme, the teachers were given the opportunity to reflect on their own views as well as their colleague’s views on technology and technology education, teaching pedagogies, and technological practices. A power point and video presentations on technological concepts and practices, and classroom practices in technology education were also used, and the teachers reflected on them during discussions as well. The workshops were also used as time for teachers to meet and reflect on their six weeks’ work as they shared with other teachers. As Anthony commented:

“This kind of workshop is good as it gives us time to do what we have learnt during the workshops in our classrooms, and then returned to another workshop to share with you and other colleagues”.

2.4.3. Teacher Support

Teacher development in it self, is a form of teacher support. Jones and Compton (1998), suggest that a professional development programme on technology education that considers the importance of teachers developing a robust concept of technology education, technological pedagogy and technological practices would aid an effective technology curriculum implementation and a successful technological classroom practitioner. A similar approach was adopted for this professional development in technology education in the Solomon Islands. Other forms of teacher support in professional development which was also taken into account included teachers talking to each other (Bell, 1993; Bell & Gilbert, 1996; Bell, 2005), and providing teacher support during classroom practices.

The classroom teacher support was provided by the researcher during the classroom practice sessions on a regular basis to enhance the teachers’ confidence in adjusting to new situations (Jones, 2003). As Timmy commented; “your visits to our school is very helpful. The questions you asked the students have helped me to see what I need to do in order to move them forward”. Another teacher, Richard had used the school visits for the confirmation of his classroom practice, as he stated; “I always look forward to your school visits because your visits have helped me to see whether I am doing the right

thing or not". Providing classroom teacher support is the crucial factor in enhancing change to teachers' classroom practices.

2.5. The Impact of the Professional Development on Teachers' Perceptions of Technology and Technology Education: 2006 Findings

At the end the teacher professional development intervention programme, the teachers' perceptions were investigated again. The followings are the findings of the teachers' perceptions of technology and technology education in 2006, and are discussed under two themes, such as: (a) the teachers changed perceptions of technology, and (b) the teachers changed perceptions of technology education. The details are discussed next in turn.

2.5.1. The Teachers' Changed Perceptions of Technology

The teachers' perceptions of technology have changed and are discussed under two new themes; (a) technology as a combined application of knowledge, skills and tools/resources, and (b) technology as process used to solve problems / meet needs of society.

The teachers who perceived technology to be a combined application of knowledge, skills and tools/resources talked about technology as the use of knowledge, skills, and resources to solve practical problems in real life situations. As Richard, pointed out: "Technology is an application of knowledge, skills and resources to solve practical problems in a real life situation". Another teacher, Gilson reiterated the same view as he stated that; "technology is an application of knowledge, tools and skills to solve problems to meet the current need of certain individuals (a customer) or society". The teachers who shared this view talked about technology as a way in which society or individuals have used knowledge, skills, resources and tools to solve problems or meet needs of societies or individuals.

The majority of the teachers perceived technology as process used in solving problems/meeting needs of society. These teachers talked about the process used by individuals and societies to identify and solve societal problems or meet societal needs. For example, Anthony stated that, "technology is the process by which society, communities and individuals identify problems and seek to solve them". Another teacher, Zebedee pointed out that the process in which societal needs are being met was "through the development of products". The process of doing something to meet societal needs and solve problems was perceived by Timmy to be involving tools and machines, as he commented; "technology is a process of doing something along with tools and machines to accomplish a particular task to meet a need or solve a problem". Seemingly, the teachers perceived technology to be the means of identifying needs and problems of individuals or societies, and seeking solutions to solve the problems or meet the needs by way of developing products along with a combined use of knowledge, skills, tools and resources.

2.5.2. The Teachers' Changed Perceptions of Technology Education

The teachers' perceptions of technology education have changed and are discussed under two new themes, such as; (a) technology education as technological knowledge development focused and (b) technology education as vocational/technical career preparation.

The teachers who perceived technology education to be technological knowledge development focused talked about technology education as the avenue by which ranges of technological knowledge could be learnt. For example, Gilson stated the know-how [procedural knowledge] knowledge which is required for solving problems and needs in society, was developed through technology education. He stated that:

"Technology education is about developing technological knowledge and understanding. Understanding of problems and needs in society and to have the know-how knowledge in solving them".

Along with the know-how knowledge, technology education also created awareness of the inter-relationship between technology and society. As Timmy commented:

"Technology education is to develop technological knowledge, capability, and also to develop an understanding and awareness of the inter-relationship between technology and society".

The teachers' perceptions of technology education seem to focus on the body of knowledge which can be developed through technology education.

The teachers who viewed technology education as vocational/technical career preparation, talked about technology education as directly involved in preparing students for future careers. Anthony stated that; "technology education is focusing on developing students to become tradesman, technicians, engineers etc". The development of both cognitive (convergent and divergent thinking) and technical skills through technology education was perceived as an advantage for preparing students' future careers. Richard explained:

"Technology education enables students to develop both cognitive skills and technical skills to address situations in a more meaningful manner in class and in their future career".

This view on technology education advocates the notion that technology education provides a vocational path in which to prepare students for future careers.

2.6. The Impact of the Professional Development on the Teachers' Classroom Practices: 2006 Findings

The professional development intervention programme had also impacted on the teachers' classroom practices. The teachers' changed classroom practices are discussed under four themes, such as; (1) integrated theoretical and practical lessons, (2) teaching without the use of the prescribed documents (textbooks), (3) the open tasks and context based teaching approaches, and (4) the teachers' enhanced assessment practices.

2.6.1. Integrated Theoretical and Practical Lessons

The professional development programme has impacted on the teachers' fragmented teaching approaches of theoretical and practical lessons. The teachers were now able to see the significance of integrating the theoretical lessons with practical lessons. As Ronald commented:

"The new approach helped me to take into account the balance between knowing and doing rather than separating the knowing and the doing. The theories falls well within the time the students need it in order to do the task".

The same view was reiterated by another teacher, Zebedee as he pointed out the significance of slotting the theoretical lessons at the right time to assist the students with the practical tasks at hand. He said; "the new teaching approach has helped me a lot to see where and when to slot in a theory note to assist the students with their practical work". The teachers began to see that theoretical lessons should not be taught in isolation from practical tasks but rather integrated in a timely manner to assist students with the practical task at hand.

2.6.2. Teaching without the Use of the Prescribed Documents (Textbooks)

The professional development programme thus changed the teachers' perceptions of relying on prescribed teaching documents. The teachers indicated that relying entirely on the curriculum produced documents and textbooks to teach their lessons were unnecessary. Richard explained that, "with the new approach I don't need to rely on the syllabus and also the curriculum produced textbooks to teach from". As the teachers' tasks were based more on a real life situation and the students' tasks were more open, a total dependant on the textbooks was considered to be unnecessary. Raymond pointed that:

"When we identify our own tasks, we don't really need the content in the syllabus and textbooks, because our content is going to be picked from the task. So what we might need to look for are other resource books that have the notes related to the tasks".

The teachers' understanding of technological pedagogy enabled them to see the curriculum produced textbooks as not the only resource materials to rely on for teaching.

2.6.3. The Open Tasks and Context Based Teaching Approaches

The teachers' previous closed task based, teacher dominated, and textbook oriented teaching approaches were also changed to a more open task, student centred, and context based teaching approach focused. An open task approach gave students the opportunity to work on individual designs within a specific context, and consequently, a range of various tasks were undertaken by the students from a range of schools. For example, Anthony asked his students to find suitable and durable materials which could be used for a dust brush. Similarly, Timmy gave his students the task of designing and making a soap package, which to be used for the soap bars made by form 1 science students. The range of various projects being made by students actually has their own individual uniqueness, rather than resembling the same feature.

As the focus of the teaching approach shifted from being teacher dominated (teacher-centred) to being student-centred, the students learning tend to be more active, and teachers' teachings approaches tend to become less authoritative. Some students activities involved community researches, as Timmy stated; "I sent my students to go down and visit the industries in the city, such as the soap factory, and the Keen Signs printing press to collect information". Rather than confining all teaching lessons within the classroom boundaries, the students' participations were extended beyond the four classrooms walls.

2.6.4. The Teachers' Enhanced Assessment Practices

The teachers' assessment practice has also improved as the teachers' formative interactions seemed to be a two-way conversation, instead of being one sided. The students' responses were much more extensive, as students talked more openly and freely about the tasks at hand and the processes undertaken during the tasks. Additional tasks were also included for summative assessments. This included; students' self assessment, students' design journals, (design folio) and skills assessment of students' completed tasks. In brief, the teachers' formative assessments seemed to be more interactive with summative assessments based on a wide range of student-tasks.

3. CONCLUSIONS

The findings from this study revealed that prior to the teacher professional development intervention programme, the participating teachers in the Solomon Islands held narrow perceptions of technology and technology education. The teachers' perceptions of technology were narrowly focused on the physical elements and technology education as skills-related focused learning, which also influenced their classroom practices. Consequently, the teachers' classroom practices were disintegrated, textbook oriented,

and teacher dominated with a limited understanding of assessment for effective learning. The professional development programme has contributed significantly in enhancing the teachers' perceptions of technology and technology education as well as their classroom practices. After the professional development intervention programme, the teachers' perceptions of technology and technology education has been broadened to include a more broad rational understanding of the combined technological knowledge, skills, tools and resources, along with nature of technology and its' relationship with society. Perceiving technology in relation to society has reflected technological literacy (Daker, 2005), which also implies that the teachers now have much broader perceptions of technology and technology education.

The teachers' classroom practices have also significantly enhanced by the professional development intervention programme. The teachers' classroom practices have been enhanced to include; the integration of knowing and doing in teaching lessons, less depending on prescribed textbooks, student-centred teaching approach and a better understanding of assessment for learning. The enhancement of the teachers' perceptions of technology and technology education and their classroom practices were significantly influenced by the nature of the professional development programme. The teachers' reflections both on teacher perceptions of technology and technology education, and classroom practices during the serious of teacher workshops have created an opportunity for the teachers to learn from each other. The teacher support given by the facilitator during classroom practice has also provided the teachers with confidence in adjusting to new situations during classroom practices. In conclusion, the teachers enhanced perceptions and classroom practices in technology education were significantly influenced by the professional development programme which based on the principles of on-going professional development, teacher reflection and teacher support.

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