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What about our talented students?: An exploratory study

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AKO AOTEAROA NATIONAL CENTRE FOR TERTIARY TEACHING EXCELLENCE

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Executive summary

This study was the final phase in a three-phase project. The first phase was exploratory in design and explored across four faculties, what support existed for high achieving students. The second phase introduced the intervention outlined below to one faculty in which there were no supports for high achieving students. The current phase introduced the same intervention across three contexts and was designed to support the learning of talented undergraduate students in tertiary settings. The study was based in three institutions: The Universities of Auckland and Waikato (based in the Faculties of Education) and Massey University (based in the College of Sciences).

Students whose Grade Point Average (GPA) was above 7.0 (i.e., students' whose overall grade across all their courses was in the A range) were identified in the respective institutions and invited to take part. Of those (*N* = 496), 126 students chose to take part. The intervention had five components:

1) A congratulatory letter sent to all undergraduate students receiving a GPA above 7.0 across all their courses
2) An invitation to a morning or afternoon tea
3) Invitations to all research seminars and presentations (normally reserved for staff and postgraduate students)
4) The opportunity to work alongside an academic on a research project
5) Acting as academic mentors for other undergraduate students

Quantitative data were gathered at the beginning of the study in order to determine differences among groups represented in the sample. Students (*n* = 55) *were* interviewed about their backgrounds, why they considered they had been identified, factors they believed had helped or hindered their learning, and perceptions of university support for their learning. Following the intervention student views on its success were sought in a questionnaire and focus group interview.

Quantitative data

The students in the current group appeared to have stronger self-beliefs (motivation, grit, and self-concept) than students from other undergraduate groups participating in international studies (e.g., Vallerand, Blais, Brière, & Pelletier, 1989; Marsh & O'Neill, 1984). There were no statistically significant differences in the beliefs of the different ethnic groups. Male students had more positive academic and problem solving self-concept than females. Younger students compared with older students, and those who entered university directly from school compared with those who entered through the special admissions programme, had greater extrinsic motivation. Conversely, those entering via special admissions showed more grit (determination) than those entering directly from secondary school. Conjoint students showed more pleasure from accomplishing something than science students; whereas, science students showed more uncertainty about why they were in their programme (amotivation) than education students. This difference likely reflects the different programmes students were engaged in at the three sites.

Qualitative data

Students reported being very pleased to have been invited to be part of this study. The qualitative data showed that in contrast to science students, many education students had not been overly successful at school but had worked really hard at their studies. They credited hard work and determination with their success. Many education students also spoke of the positive influence of family in supporting their studies. In contrast most of the science students had been high achievers

at school. Many were in the pre-veterinarian programme and had not received the required marks to enter the second year programme, even though they had high GPAs. Hence, despite being high achievers by the definition used in the project, some were not feeling positive about their achievement. Many students in the education programmes talked about personal hardships that had impacted on their studies; whereas, those in science and conjoint programmes were more likely to talk about structural factors and the quality of lecturers as influencing their success. Some thought that postgraduate opportunities needed to be made clear to students at the beginning of their undergraduate study.

The focus group data showed that although students appreciated the invitation to this project, time pressures meant that some had not participated to the extent that they might have because of a lack of timeliness of invitations or opportunities not having been made available. Some had formed friendships and collegial groups as a result of being involved in the project. The idea of a Moodle or Facebook page for groups like this was strongly recommended. Such a page could provide a venue for announcements related to working on research projects, meetings of the group, opportunities to attend professorial presentations and seminars, and mentoring opportunities. Students suggested that they would appreciate the opportunity to hear postgraduate students presenting their research.

Recommendations and guidelines

As perceived by staff and reported by students, the intervention successfully supported the talented students' learning in a number of ways. Through the morning teas, the talented students became aware of other similarly successful peers and created their own learning and support groups. They could share their success in these groups. These events are inexpensive but very useful in creating support networks for talented students. Students felt able to enjoy their success with other high achieving students rather than covering up their results as they had done previously. However, it is important that students realise the significance of such an invitation when it is first distributed. Such invitations would be more positively received from senior staff members rather than those conducting a research project. Further, students suggested having some postgraduate students present their work at these events. They believed that such presentations would be of interest to them and could inspire them to move into postgraduate study themselves.

The congratulatory letters were appreciated not only as recognition of hard work and persistence but also as a useful addition to the students' CVs. However, the significance of these letters needed to be clearer because at least one student initially discarded hers thinking that everyone received one. One suggestion is that all students are made aware that high achieving students will receive recognition via these letters. A statement could be added to course booklets, for example, so that all students were aware. There was also a suggestion from the students that such emails and letters should come from a senior staff member, for example, the Associate Dean Teaching and Learning or the Head of Programme.

Some students had attended academic seminars and presentations. However, at times they did not receive timely advice of these. If these intervention strategies were to be initiated in other institutions, it would be wise for the talented students to be added to any databases or list-servs that disseminate advice of such seminars in order to ensure that the talented undergraduate students were informed in a timely manner.

Many students were keen to be involved in research projects alongside academics. However, it did not seem that this provision was made as visible or available to students as it could have been. At the end of the intervention, a large proportion of the students reported being keen to continue into

postgraduate study. The opportunity to work alongside an established academic in a research project is an excellent opportunity for such students to discover whether they would be interested in further study or in advancing an academic career. Such students could work as research assistants, not necessarily paid, but simply for experience. It would seem that academics could also be keen to involve such students, particularly if there was no cost involved. In order to promote this idea, academics need to be made aware that such students would be keen to be involved. This could be achieved through a staff email or even an announcement in a staff meeting. Staff could post advertisements on a Moodle or Facebook page dedicated to the talented students (see below).

Some students did become involved as academic mentors to other undergraduate students. This involved providing clarity around what was expected in assignments, feedback on draft assignments, information about how to study for examinations, suggestions of readings, and so on. Students who did engage in this opportunity reported that they had enjoyed the experience and that in many instances it had increased their own understanding about concepts when they had to explain them to others. Again, this is an opportunity that can be paid or unpaid, depending on budgets. The opportunity appeared to be valuable for both the talented students and the mentees.

There was a suggestion from some students that they would have liked to have been mentees. Several reported that they would have liked information about postgraduate study early in their undergraduate courses to facilitate future planning. Further, the opportunity to be involved in research projects would provide mentoring for high achieving students. A further possibility is that a staff member assumes the responsibility for the high achieving students and this, could manage the Moodle (or Facebook) page (see below) and could also become a key support person for this group of students.

In one of the institutions, a Moodle page had been set up specifically for the students identified as talented. This was extremely successful and could be particularly useful in institutions where the students were learning by distance or where campuses were spread out. Again this page put students in touch with each other so that they could get to know each other and provide support for one another. Further, such a page could be used to advertise positions working alongside academics, events and meetings specifically for this group, and academic seminars and presentations. Because new students would become part of this group each year, it could also be a place to welcome them. Further possibilities suggested by some students were to have a blog or a Facebook page.

Although the current study used grades to identify the talented students, it is acknowledged that other criteria for inclusion could also be used.

Introduction

This report presents the results of a study designed to introduce an intervention aimed at supporting the learning experiences of talented undergraduate students. The study was carried out across three universities in Aotearoa New Zealand. Talented undergraduate students from the three institutions were identified using achieved grades as the defining factor for inclusion. As part of the data collection, students participated in up to three activities. All students involved in the study completed questionnaires so that the researchers could investigate group differences at the beginning of the study. Some students also opted to participate in interviews to explore background characteristics of the students and perceptions of factors that supported their learning. One group took part in a follow-up focus group in order to evaluate the intervention and a small sample also completed a short survey as an evaluation of the intervention.

The report begins by introducing the literature in relation to talented students. It demonstrates that there is limited research around talented students at the tertiary level. The methods used for collecting the data are presented and the findings outlined. The report ends with recommendations related to the success of each of the components of the intervention thus providing guidelines for how the learning experiences of talented students within tertiary environments might be enhanced. This project was only recently completed and so there are limited outputs resulting from this project at present. However, several papers and presentations are being planned as outlined in the final section of the report.

Background to the Study

The current study was the final phase of a three-phase project. In the first phase (see Rubie-Davies, et al., 2010), a group of six researchers from the University of Auckland held focus groups with academic staff and undergraduate students from four faculties with the goal of discovering what, if anything, was done in these faculties to support high achieving students. Three of the faculties had supports and structures in place for their high achieving undergraduate students and the students reported high levels of satisfaction with their university experience. In these three faculties, students were provided with additional opportunities or extension activities. In the fourth faculty, no structures were in place; occasionally some staff reported encouraging high achieving students in an ad hoc manner; but the students reported high levels of dissatisfaction with their experiences. There were reports of humiliation, belittling, denigration and criticism of students from staff related to their high achievement. Some had become amotivated.

These findings led to phase two of the project which consisted of the implementation of an intervention in the faculty lacking supports for high achieving students. The intervention was designed around the processes and structures in place in the other three faculties that participated in the first phase of the project. Although some of those faculties had quite complex procedures in place (e.g., advancing students through courses enabling them to graduate early), because the intervention was being introduced by researchers over a one-year period, the intervention needed to be kept relatively simple. Further, it was hoped that eventually the intervention might become standard practice in the faculty concerned and therefore needed to be cost effective. The intervention was designed as follows:

1) A letter to all students scoring a GPA of 7.0 or higher across all their undergraduate courses, congratulating them on their achievement
2) An initial invitation to a morning tea to all students with a GPA of 7.0 or higher across all their courses. This morning tea provided an opportunity for the high achieving students to identify each other, provide an opportunity for them to begin forming relationships with similarly high-achieving peers (so they no longer needed to feel ashamed of their high

achievement), and possibly form study groups. At a later morning tea, a current masters student came and spoke to the students.
3) Invitations to this group to all academic seminars and public lectures (normally such invitations only went to postgraduate students) and also advice of possible postgraduate scholarships
4) An invitation to become mentors who could provide academic support for assignments, tests and examinations to other undergraduate students
5) Opportunities from academic staff to work alongside researchers in research projects as research assistants

At the end of the year of this intervention phase of the project, the students reported much higher levels of satisfaction with their university experience overall. They spoke about their appreciation of the recognition that the letters gave them. They also spoke about their gratitude in having been given the opportunity to meet other similarly high achieving peers with whom several had formed on-going study groups and relationships. Many reported now considering moving into postgraduate study – something they had not previously considered. Because of the success of this phase of the project, a third and final stage was planned across the three universities previously mentioned.

Hence, the primary goal of phase three of the current project was to introduce the intervention, previously trialled in one institution, across three sites, and which had been shown to be very successful in terms of supporting high achieving students. The aim of the study was to see if the intervention could be successfully transposed into other institutions, thus having the potential for wide applicability across tertiary institutions in Aotearoa New Zealand. This would mean that ultimately the learning and learning experiences of our highest achieving students could be enhanced. It was also hoped that an outcome of the study would be talented students recognising their potential to complete postgraduate study and becoming interested in the opportunity of doing so.

The terms 'talented' and 'high achieving' rather than 'gifted' were used in the recruitment of participants because the term 'gifted' is often associated with narrow perceptions of elitism into which only a few very able students might fall. Further, the trial study had shown that identified students were not comfortable with the 'gifted' label, perceiving themselves to be hard-working rather than gifted. We wanted to provide a term that was more broadly based and had fewer emotive associations. Further, because we were only using GPA as the identification criterion, there was no theoretical base for equating GPA with giftedness.

Hence, the project was designed to learn more about the characteristics of high-achieving undergraduate students in a tertiary institution and to determine whether or not a cost-effective intervention could enhance their experiences in their respective institutions. The intervention was based around the findings of the first phase of the project (see Garrett & Rubie-Davies, 2015; and see above) which was also funded by the Ako Aotearoa Northern Regional Hub Project Fund. The intervention was trialled in 2011-2012 in one faculty and resulted in high levels of student support for those involved in the project (see Millward, Wardman, & Rubie-Davies, under review; Millward, Wardman, & Rubie-Davies, 2014; Millward, Wardman, & Rubie-Davies, 2013; Millward, Wardman, & Rubie-Davies, 2012).

Talented students can potentially contribute much to our society and to our economy (Marland, 1972; Renzulli, 2004). However, there appears to be a paucity of research in relation to talented students at the tertiary level. The limited evidence we were able to locate in relation to tertiary students suggested that they were a largely neglected group within the tertiary sector (Abeysekera, 2008; Moltzen, 2008; Rinn & Plucker, 2004). The literature emphasised the importance of

investigating what was happening at this level in order to more effectively support and enhance these learners' experiences (Abeysekera, 2008; Moltzen, 2008; Rinn & Plucker, 2004; Vuong, Brown-Welty, & Tracz, 2010; Yan & Yuan, 2004).

The potential of our talented students to benefit Aotearoa New Zealand – regionally, nationally and internationally – is significant and therefore there is much to be gained by focusing on an intervention designed to enhance their learning and experiences. Further, having already run a trial of the intervention (see Millward, et al., under review; Millward et al., 2014; Millward et al., 2013; Millward et al., 2012), there was evidence that high achieving students could benefit from recognition of their talents, opportunities to make connections with each other, as well as additional learning opportunities such as mentoring other students, attending academic seminars and working alongside an academic on a research project.

However, before the first phase of this study began, no research could be located related to talented undergraduate students and no evidence that tertiary institutions tailor learning experiences for their high achieving students. Indeed, as Moltzen (2008, p.2) has highlighted, "There seems to be a perception that at school it is important to differentiate the curriculum to meet diverse levels of ability... but at university a 'one size fits all' approach is appropriate". Moltzen suggested this was a major factor contributing to the underachievement and non-retention of talented students. Given the success of the second phase of the project in which the intervention was introduced in one faculty, it was anticipated that the experiences offered within the intervention could enhance the learning of high achieving students and motivate them to remain in the tertiary sector longer. In line with Ako Aotearoa's focus on celebrating and sharing best practice and building strong collaborative relationships, an underlying aim of the project was to extend the project across three institutions in order to determine whether the intervention could be of benefit to high achieving students across a range of contexts, and therefore possibly be applicable across all tertiary institutions in Aotearoa New Zealand.

Whether or not schools should cater for gifted and talented students became an issue for New Zealand schools to debate around the year 2000. The National Administration Guidelines (NAGs) for school administration are set out by the New Zealand Government and each school Board of Trustees governs the school by following the NAGs. Although private schools, unlike state and integrated schools, do not have to comply with the NAGs, in reality, most do so voluntarily. In December 2003 a notice in the New Zealand Gazette advised that NAG 1(iii)c had been amended with a footnote that stated: "including gifted and talented students". From Term 1, 2005, therefore, it has been mandatory for all state and state-integrated schools to demonstrate how they are meeting the needs of their gifted and talented learners, as they were already required to do for students who were not achieving, who were at risk of not achieving, and who had special needs. Nevertheless, tertiary institutions are not covered by the NAGs and therefore they still do not have to specifically identify and provide for their gifted and talented learners. Hence, special programmes for high achieving students or staff support for such learners tend to occur only when academic staff in particular tertiary departments have an interest in these students or the department as a whole makes a decision to introduce formal procedures. In many tertiary departments, no support is provided for high achieving students as was evidenced in the first phase of this project when one faculty had no structures at all in place in any department throughout the entire faculty.

Recent literature suggests that in adulthood, the gifted and talented label can only be attributed to those who achieve eminence (Subotnik, Olszewski-Kubilius & Worrell, 2011). While this position is being debated internationally, it is important to both staff and students of tertiary institutions to know what support is available and achievable. The students may then be supported to reach the higher levels of achievement and perhaps reach eminence in their field.

Because a highly-educated workforce is important for economic productivity, it was believed that identifying this sector of students could provide valuable information, currently lacking, about how they could be supported to reach their full potential. Further, the collection of quantitative data within this project enabled us to analyse the kinds of students who were identified as talented across the three institutions. As indicated earlier, research investigating education for talented students at the tertiary level remains largely unchartered territory (Abeysekera, 2008; Moltzen, 2008; Rinn & Plucker, 2004). Indeed we were unable to locate a single study, conducted in Aotearoa New Zealand or internationally, aimed at enhancing the learning of talented students within the tertiary environment. Given this and the relative lack of any research in relation to giftedness and talent at the tertiary level, it would seem imperative to investigate the issues and the directions needed in this area, particularly given that we are dealing with a human resource that should be nurtured for both individual and national development (Abeysekera, 2008; Moltzen, 2008).

It was anticipated that an increased focus on talented students and enhancing the tertiary environment to better meet their needs, would result in them enjoying enhanced learning opportunities and experiences. Given the success of phase two of this project in increasing the engagement and learning of talented students in one faculty, it was also believed that pedagogical practice and student achievement within the faculties involved in the study would be further strengthened, specifically in relation to talented students, but also for a greater number of students overall. Good practice for one group of students may lead to improved practice for others. Moreover, it was anticipated given the success of the second phase of this study that the intervention developed from the original exploratory study could be implemented across a range of other institutional settings and faculties. Hence, as in phase two of the study, the current study explored the characteristics of talented students across three institutions, introduced an intervention designed to enhance their learning and lead to retention into postgraduate study, and aimed to facilitate support networks among the students. Both quantitative and qualitative data were collected. The quantitative data consisted of a questionnaire which the identified students were invited to complete, and qualitative data which consisted of interviews and a focus group, formed the major component of the data collection.

Method

Participants

Across the three faculties involved in the study, 496 talented students were invited to be part of this project and 126 agreed (a 25% response rate). Of the students, 105 (85% of respondents) were female and 19 (15%) were male (2 did not provide their sex).

The age group spread was 41 participants who were less than 20 years of age, 40 who were between 20 and 25 years, and 44 who were over 25 years of age (1 person did not provide this information). It is common in education faculties for mature students to train or retrain as teachers and hence the over-representation of more mature students most likely reflects that.

In relation to ethnicity, 94 students were Pākehā, 5 were Māori, 6 were Pasifika, 12 were Asian, 3 were classified as Other and 6 did not provide their ethnicity. As can be seen, the vast majority of students identified themselves as Pākehā (78%). This proportion is representative of the faculties

involved but, of course, is not representative of the Aotearoa-New Zealand population with both Māori and Pasifika groups underrepresented.

Students most commonly entered university with a university entrance qualification (*n* = 89). Some had entered via the special admissions programmes of their respective institutions (*n* = 21) and the remainder either came to university via a different means (*n* = 6) or they did not provide their entrance information (*n* = 10)

The students in the project represented different programmes of study with 83 completing education degrees, 14 science degrees, 23 enrolled in conjoint degrees, and 6 completing a different degree. Programme enrolment reflects the institutions represented with 44 student participants from the Faculty of Education at the University of Auckland, 46 from the Faculty of Education at the University of Waikato and 36 from the School of Science at Massey University.

Measures

All students involved in the study completed a questionnaire, 55students were interviewed across the three sites and one focus group of 5 students was conducted. A further 27 students completed a survey to evaluate their involvement in the intervention.

Quantitative measure

All students involved in the study completed a questionnaire at the beginning of the study. The questionnaire asked for demographic information as reported above. It also asked for further background information related to students' prior educational background and previous experience of having been identified as a high achiever. The questionnaire also measured student motivation, grit, self-concept, and self-regulation.

Motivation

Student motivation was measured using the Academic Motivation Scale (AMS; Vallerand, Blais, Brière, & Pelletier, 1989). This scale has adequate reliability (α = .81) and measures student intrinsic, extrinsic and amotivation. Intrinsic motivation is measured using three subscales: intrinsic motivation to know, intrinsic motivation toward accomplishments and intrinsic motivation to experience stimulation. The prompt at the beginning of the questionnaire is: "Why do you go to university?" Intrinsic motivation to know relates to student curiosity and intrinsic intellectuality; for example, "Because I experience pleasure and satisfaction while learning new things". Intrinsic motivation toward accomplishments relates to student mastery of skills and wanting to feel competent; for example, "For the pleasure I experience while surpassing myself in my studies". Intrinsic motivation to experience stimulation relates to engaging in an activity in order to experience sensations such as sensory pleasure, excitement or fun; for example, "For the pleasure that I experience when I read interesting authors". Extrinsic motivation also consists of three subscales: external regulation, introjection and identification. External regulation relates to behaviour that is engendered through external sources such as rewards and controls; for example, "In order to obtain a more prestigious job later on". Introjected regulation relates to students being motivated to perform in a particular way based on previous experience; for example, "To prove to myself that I am capable of completing my university degree". Identification is regarded as the highest form of extrinsic motivation and relates to the student internalising their extrinsic motivation; for example, "Because eventually it will enable me to enter the job market in a field that I like". Finally, amotivation measures feelings of lacking competence and controllability; for example, "Honestly, I don't know; I really feel that I am wasting my time at university". There are four items for each subscale. All items on the AMS were measured on a 5-point Likert scale ranging from 1 = Does not correspond at all (to me) to 5 = Corresponds exactly.

Grit

The interviews in Phase Two of the study suggested that high achieving students possessed a good deal of persistence and self-determination, sometimes referred to as "grit". Hence, we included the Grit Scale (Duckworth, Peterson, Matthews, & Kelly, 2007) in our questionnaire. The Grit Scale contains 12 items which measure student long-term interest in and effort towards goals. The Grit Scale has good internal consistency (α = .85) and has been shown to predict success in academic areas over and above measured intelligence. Negatively worded items were reverse scored. The Grit Scale contains items that relate to long-term interests (e.g., "I often choose a goal but later choose to pursue a different one" reverse scored) and perseverance (e.g., "I have overcome setbacks to achieve an important challenge"). All items on the Grit Scale were measured in a 5-point Likert scale ranging from 1 = Does not correspond at all to 5 = Corresponds exactly.

Self-concept

Self-concept was measured by including the mathematics, verbal, problem solving and academic subscales of the Self-Description Questionnaire III (SDQ-III; Marsh & O'Neill, 1984) designed to measure the self-concept of students at the tertiary level. Each subscale has 10 items with 5 items worded positively and 5 negatively. Negatively worded items were reverse scored. This scale has very good reliability (α = .89). Mathematics self-concept relates to perceptions of competence in mathematics; for example, "I find many mathematics problems interesting and challenging." Verbal self-concept relates to perceptions of competence in reading, writing and oral language; for example, "Relative to most people, my verbal skills are quite good." Problem-solving self-concept relates to perceptions of competence with solving problems; for example, "I enjoy working out new ways of solving problems." Finally, academic self-concept concerns ideas about all academic subjects; for example, "I am good at most academic subjects." All items on the SDQ-III were measured on a 6-point Likert scale ranging from 1 = False to 6 = True.

Self-regulation

Self-regulation was measured using the Self-Regulation Questionnaire (SRQ) developed by Brown, Miller and Lawendowski (1999). The SRQ is designed to measure perceptions of behavioural control or the ability to self-regulate. The authors report high internal consistency (α = .91). Although there are seven subscales in this questionnaire (receiving, evaluating, triggering, searching, formulating, implementing and assessing) and a total of 63 items, the authors recommend combining responses into one score for reporting purposes. An example of a receiving item is, "I usually keep track of my progress toward my goals." An example item for evaluating is, "I tend to compare myself with other people." One of the triggering items is, "I am willing to consider other ways of doing things"; a searching item is, "If I wanted to change, I am confident I could do it"; a formulating item is, "Once I have a goal, I can usually plan how to reach it"; an implementing item is, "I have a lot of willpower"; and an assessing item is, "I reward myself for progress towards my goals." All items on the SRQ were measured on a 6-point Likert scale ranging from 1 = False to 6 = True.

Qualitative measures

Two forms of qualitative data collection occurred in this project. Firstly, data were collected during individual semi-structured interviews with students. The following questions guided the interviews:

1. In order that I get an idea of you as a person, please describe yourself.
2. Please tell me a little bit of your family history/circumstances/general health/in terms of what you think may be relevant to this study.
3. Please describe the process through which you chose your present programme of study.
4. How would you describe the story of your undergraduate studies so far?

5. What are the factors that have enhanced your learning experiences? What factors have hindered your learning experiences?
6. Please explain your feelings on being informed of your selection for participation in a study of gifted and talented students.
7. How has the Faculty of Education/Sciences supported your learning so far?
8. Have you received anything from the Faculty of Education/Sciences that has encouraged you to consider postgraduate study?
9. Would you want your child to be identified as gifted and talented? Why / why not?
10. What are the main factors that you think have contributed most to your academic success?
11. The Faculty of Education/Sciences would really like to ensure that it recognizes and rewards its top students. What do you think it should do?
12. Are there any other comments you wish to make?

The second means of collecting qualitative data was through a follow-up focus group with 5 Education students who participated in the project in order to assess their perspective of the value of the project. This focus group was also supported with quantitative information from a follow-up survey taken from a random selection of other student participants (n = 27) which we used to gauge the degree of participation in the opportunities that had been provided for the talented students.

Procedures

Permission to conduct the study was obtained from the Human Participants Ethics Committees of each institution. Permission to obtain the contact details of all undergraduate students who achieved a GPA greater than 7.0 at the end of the first semester 2013 was obtained from the Deans of the respective faculties and school. An invitation to participate was sent to all eligible undergraduate students along with the PIS, CF and the initial survey. An invitation to volunteer to be interviewed was also included. The intervention was then introduced to talented undergraduates who agreed to participate in the study. The intervention was comprised of:

- sending a congratulatory letter to every student who attained an A range GPA (> 7.0) across all their courses
- an invitation to a morning or afternoon tea
- an invitation to attend seminars and workshops in the Faculty or school
- an invitation to act as informal mentors to other undergraduate students in the Faculty or school
- an invitation to apply for summer scholarships to work with an academic on a research project over the university summer break

Interviews were carried out once the intervention was underway and the focus group was conducted following completion of the project. At the same time another group of students completed a brief survey designed to gauge levels of participation in the various components of the intervention.

Data analysis design

Data from the questionnaires were entered into a data base by a research assistant employed to manage the project. Means were calculated and these were examined for specific groups to ascertain differences. Means were also used to examine the responses of this group of participants compared with the original means developed for each scale where these were available.

At the time of writing this report, although the qualitative data have been summarised, they have not yet been rigorously analysed using an agreed upon theoretical framework. Thus, the qualitative

findings are presented as a summary of responses to key questions, with some initial codes and supporting statements from student participants.

Quantitative Findings

The quantitative data were analysed in two ways. Firstly, where possible, we compared the means for our sample with the means in original validation studies for each instrument. This enabled us to assess whether or not our participants held differing beliefs from those in the original validation studies. Secondly, we examined our data by comparing groups within our sample in order to see if there were differences in beliefs between specific groups.

Comparisons with the original studies

Where means were provided for the original scales, independent *t*-tests were calculated in order to determine if there were any differences between the students in the current study and those in the validation studies. Means and standard deviations for those scales for which they were available and for the current sample may be found in Table 1.

In terms of motivation, there was a statistically significant difference between the two groups for amotivation ($t = 5.44$; $p < .001$), introjected regulation ($t = 7.66$; $p < .001$), identified regulation ($t = 18.27$; $p < .001$), intrinsic to know ($t = 19.01$; $p < .001$), intrinsic to accomplish ($t = 12.79$; $p < .001$), and intrinsic for stimulation ($t = 10.12$; $p < .001$). However, there was no statistically significant difference between the groups for external regulation. In all cases where there were statistically significant differences, the means for the group of talented students were greater than those of the original sample on which the questionnaire was based, and particularly for intrinsic motivation, these differences were very large. This means that the talented students were more amotivated, more extrinsically motivated (introjected and identified regulation) and much more intrinsically motivated than the students in the validation study.

The second section of the questionnaire included the 12-item Grit Scale. Duckworth et al. (2007) provide means for several groups who were used in the validation of the scale. We chose to use the mean of the group in Duckworth et al.'s study that most closely reflected the group in the current study, Ivy League undergraduates. The students in Duckworth's study were those scoring in the top 4% of undergraduates entering their university and hence were similar to the students in the current study, all of whom were achieving grades in the A-range across all their courses . There was a statistically significant difference in grit scores for our participants compared to the sample of Ivy League undergraduates, ($t = 4.87$; $p < .001$). Our participants showed higher levels of grit than the original sample.

The third section of the questionnaire related to mathematics, verbal, problem solving and academic self-concept. Unfortunately, the means are not provided in Marsh and O'Neill's (1984) article related to this instrument and so we were unable to compare the means from that study with our own. However, in a New Zealand study (Rubie-Davies & Lee, 2012) a random sample of 929 undergraduate students across a number of faculties completed the SDQ-III. Hence, since those students were New Zealand undergraduates (although not exclusively talented students), we used their means to compare with those of the current sample. There were statistically significant differences between the two groups for verbal self-concept ($t = 7.377$; $p < .001$), problem solving self-concept ($t = 2.52$; $p = .006$) and academic self-concept ($t = 11.14$; $p < .001$). There was no statistically significant difference between the two groups for mathematics self-concept. In all instances where there was a statistically significant difference between our current participants and those in the study by Rubie-Davies and Lee (2012), the means for the current group were higher than those for the latter group.

The final scale included in our questionnaire was the SRQ (Miller & Brown, 1991). Miller and Brown do not provide means and standard deviations in their validation document. However, they do provide ranges which indicate high, medium and low levels of self-regulation. According to their criteria an overall mean of 4.38 for our group of students, would indicate medium levels of self-regulation.

Table 1.
Means and Standard Deviations for a Contrast Group and the Current Participants

Scales	Contrast group		Current sample	
	M	*SD*	*M*	*SD*
Amotivation	.95	.58	1.17	.45
External regulation	3.11	.72	3.17	.99
Introjected regulation	2.42	.83	3.17	1.09
Identified regulation	3.13	.54	4.19	.64
Intrinsic motivation– knowledge	2.81	.54	4.09	.75
Intrinsic motivation – accomplishment	2.39	.74	3.55	1.01
Intrinsic motivation- stimulation	1.86	.79	2.76	.97
Grit	3.46	.61	3.67	.48
Mathematics self-concept	3.94	1.22	3.87	1.19
Verbal self-concept	4.13	.79	4.62	.74
Problem solving self-concept	4.03	.69	4.20	.75
Academic self-concept	4.19	.76	4.84	.65
High self-regulation	>4.55			
Medium self-regulation	4.07-4.55		4.37	.41
Low self-regulation	<4.07			

Overall, the comparisons between the high achieving group and other contrast groups showed that the high achieving students showed more of the higher levels of extrinsic motivation than the contrast groups and were more intrinsically motivated on all scales. They also showed more grit than the contrast group, even though that group was also high achieving. This may be because our group had a large group of mature students and as will be seen below, they showed more grit than younger students. Further, the high achieving group had more confidence in their verbal, problem solving and overall academic abilities than a random sample of New Zealand tertiary students in an earlier study (Rubie-Davies & Lee, 2012).

Comparisons by group

A series of one-way analyses of variance (ANOVA) were carried out in order to ascertain any differences by group. Where there were more than two groups, post hoc Tukey tests were carried out, Tukey HSD tests where numbers in groups were similar and Tukey-Kramer tests where the numbers in the groups were not equal. Because a very large number of tests were carried out across the 13 factors from the four scales, only those that were statistically significant will be presented in the text. However, the means and standard deviations for all groups and all factors may be found in Table 2 below. Some caution is also needed in the interpretation of the results given a large number of tests on the same data and the increased probability of a Type I error. Because of the possibility of a Type 1 error being responsible for any statistically significant differences rather than any true differences in the data, effect sizes were also calculated. Effect sizes using Cohen's *d* for the statistically significant results were included in order to indicate the meaningfulness of the difference between means as defined by Cohen (1988, p.22).

Sex

There was a statistically significant difference between males and females for both academic self-concept (F (1,122) = 5.69, p = .02, d = .65) and problem solving self-concept (F (1,122) = 5.53, p = .02, d = .65). As the effect size shows, in both cases the difference was large. The mean for males was greater than that for females for both problem-solving and academic self-concept. There were no other statistically significant differences for sex.

Ethnicity

In order to enable meaningful analyses of the data, because the numbers of Māori and Pasifika students were low, they were combined for the purposes of analyses. Similarly, the group "Other" was combined with the Asian group. There were no statistically significant differences in the self-beliefs of students in relation to their ethnic group.

Age

Student beliefs were compared by age group (<20 years, 20-26 years, >26 years). There was a statistically significant difference between the oldest and youngest group of students in terms of external regulation (F (2,122) = 5.62, p = .005, d = .71). The post hoc Tukey test showed that the youngest students were more externally regulated than the oldest students (p = .007) and the effect size shows that this difference was large.

Admission

Student beliefs were compared by their admission criteria. Students who had gained entrance to university through their school achievement showed more external regulation than students who came in through the special admissions programme (F (1,111) = 7.61, p = .007, d = .58). Conversely, special admissions students scored more highly on the grit scale than did those who entered the university through their academic achievement (F (1,111) = 4.74, p = .03, d = .49). Both of these differences in means constituted a medium effect size.

Programme

The beliefs of students depending on their programme (education, science, conjoint/other) were compared. There was a statistically significant difference in intrinsic motivation to accomplish (F (2,120) = 3.62, p = .03, d = 1.06). The post hoc test showed that this difference was between the conjoint and science students (p = .02). Conjoint students were far more motivated by accomplishment than were the science students and the effect size was very large. There was also a statistically significant difference between in the groups in amotivation (F (2,120) = 5.24, p = .007, d = .57). The science students were more amotivated than the education students (p = .005).

University sites

Student beliefs were compared by the university they attended. There was a statistically significant difference between the groups for amotivation (F (2,119) = 3.62, p = .03, d = .51). The students at Massey were more amotivated than the students at Auckland (p = .03) and the effect size was medium. However, particular caution is needed in interpreting this result since it is more likely a reflection of the different programmes that the students at Massey (science and conjoint) were enrolled in compared to those from Auckland (education).

Table 2
Means and Standard Deviations by Group for Self-Belief Measures

Group	Amot	Ext Reg	Introject	Identif	I-Know	I-Accomp	I-Stim	Grit	Maths SC	Verb SC	Aca SC	Prob SC	Self-Reg
Female (*n* = 105)	1.20 (.49)	3.20 (.95)	3.20 (1.11)	4.23 (.60)	4.08 (.73)	3.56 (1.00)	2.76 (1.00)	3.68 (.51)	3.80 (1.22)	4.59 (.74)	4.78 (.66)	4.13 (.75)	4.38 (.42)
Male (*n* = 19)	1.09 (.11)	2.95 (1.19)	3.0 (1.03)	3.95 (.81)	4.14 (.84)	3.52 (1.1)	2.75 (.81)	3.61 (.35)	4.24 (.97)	4.80 (.71)	5.16 (.49)	4.56 (.65)	4.34 (.36)
<20 (*n* = 41)	1.19 (.52)	3.43 (.90)	3.07 (1.11)	4.34 (.61)	4.07 (.74)	3.51 (1.06)	2.60 (.84)	3.64 (.44)	4.14 (1.07)	4.49 (.73)	4.81 (.65)	4.05 (.86)	4.39 (.41)
20-25 (*n* = 40)	1.24 (.53)	3.32 (1.03)	3.45 (.96)	4.15 (.61)	4.13 (.71)	3.56 (.89)	2.73 (.97)	3.56 (.53)	3.81 (1.26)	4.63 (.73)	4.85 (.66)	4.16 (.67)	4.27 (.42)
>26 (*n* = 44)	1.09 (.27)	2.78 (.93)	3.01 (1.15)	4.09 (.67)	4.07 (.81)	3.57 (1.08)	2.95 (1.05)	3.79 (.46)	3.66 (1.22)	4.77 (.75)	4.87 (.65)	4.36 (.67)	4.47 (.38)
NZ Euro (*n* = 94)	1.19 (.49)	3.15 (1.01)	3.16 (1.12)	4.16 (.65)	4.09 (.74)	3.47 (1.03)	2.75 (.99)	3.68 (.48)	3.84 (1.24)	4.62 (.72)	4.80 (.65)	4.20 (.74)	4.39 (.43)
Maori/ Pasifika (*n* = 11)	1.16 (.45)	2.98 (.90)	2.89 (.96)	4.17 (.68)	4.11 (.68)	3.57 (1.14)	2.91 (.86)	3.91 (.31)	3.81 (1.00)	4.82 (.85)	5.24 (.59)	4.35 (.78)	4.52 (.33)
Asian Other (*n* = 15)	1.05 (.19)	3.32 (.94)	3.28 (1.14)	4.40 (.52)	4.17 (.75)	3.90 (.77)	2.95 (.87)	3.50 (.57)	4.23 (1.12)	4.67 (.80)	4.82 (.67)	4.31 (.77)	4.28 (.35)
Uni Ent (*n* = 89)	1.19 (.50)	3.33 (.90)	3.21 (1.07)	4.20 (.59)	4.13 (.72)	3.55 (.99)	2.76 (.99)	3.61 (.48)	3.88 (1.24)	4.63 (.77)	4.82 (.68)	4.19 (.80)	4.37 (.41)
Spec Adm (*n* = 24)	1.16 (.35)	2.72 (1.18)	3.22 (1.20)	4.17 (.78)	4.04 (.65)	3.61 (1.10)	2.91 (.81)	3.84 (.45)	3.93 (1.11)	4.64 (.66)	4.98 (.54)	4.14 (.55)	4.40 (.38)
Education (*n* = 80)	1.11 (.30)	3.13 (1.02)	3.13 (1.23)	4.21 (.65)	4.09 (.79)	3.55 (1.08)	2.84 (.99)	3.67 (.51)	3.81 (1.20)	4.64 (.75)	4.80 (.67)	4.19 (.75)	4.42 (.42)
Science (*n* = 14)	1.52 (.98)	3.38 (.93)	3.00 (.93)	4.15 (.58)	3.99 (.67)	2.96 (.95)	2.32 (.88)	3.53 (.38)	4.29 (1.20)	4.39 (.75)	4.79 (.53)	4.50 (.76)	4.32 (.42)
Conjoint (*n* =	1.19	3.26	3.36	4.15	4.17	3.83	2.77	3.73	4.72	4.72	5.04	4.09	4.30

29)	(.36)	(.92)	(.70)	(.65)	(.58)	(.66)	(.83)	(.47)	(1.21)	(.65)	(.62)	(.74)	(.36)
Auckland (*n* = 43)	1.06 (.27)	3.15 (1.08)	3.27 (1.24)	4.16 (.64)	4.10 (.77)	3.64 (1.08)	2.88 (1.01)	3.72 (.51)	3.68 (1.35)	4.84 (.73)	4.88 (.67)	4.27 (.64)	4.47 (.44)
Waikato (*n* = 44)	1.13 (.30)	3.03 (1.01)	3.06 (1.16)	4.18 (.69)	4.08 (.78)	3.56 (1.06)	2.82 (.97)	3.66 (.51)	3.75 (1.10)	4.52 (.74)	4.72 (.66)	4.05 (.81)	4.36 (.39)
Massey (*n* = 35)	1.32 (.67)	3.42 (.82)	3.19 (.82)	4.21 (.58)	4.15 (.65)	3.43 (.88)	2.59 (.91)	3.62 (.45)	4.17 (1.08)	4.51 (.70)	4.93 (.59)	4.30 (.77)	4.30 (.39)

Notes: Means are presented in each cell followed by standard deviations in brackets. Among the variables, Amot = Amotivation; Ext Reg – External regulation; Introject = Introjection; Identif = Identification; I-Know = Intrinsic-Knowledge; I-Accomp = Intrinsic Accomplishment; I-Stim = Intrinsic Experience Stimulation; Maths SC = Mathematics Self-concept; Verb SC = Verbal Self-concept; Aca SC = Academic Self-concept; Prob SC = Problem solving Self-concept; Self-Reg = Self-regulation. Among groups, NZ Europ = New Zealand European; Uni Ent = University Entrance; Spec Adm = Special Admission. The first 8 variables are measured on a 5-point scale whereas the later 5 are measured on a 6-point scale.

It was perhaps not surprising that males rated themselves more highly than females on both academic self-concept and problem-solving self-concept. Other studies (e.g., Dweck, 1999) have shown that teachers believe that boys have more innate intelligence than girls whereas girls work harder. Dweck has suggested that teachers project these messages to students. What was interesting in the current study was that there was no statistically significant difference in male and females' self-concept in mathematics. Mathematics has often been considered a male domain and a place where males are more successful than females (Split, Koomen & Jack, 2012). Nevertheless, caution is needed in interpreting our results given the small number of male participants in the current study.

There is evidence that self-beliefs differ by ethnicity and culture (King & McInerney, 2014) and yet none were found in the current study. This may be because the low numbers within groups other than Pākehā made the finding of statistically significant differences more difficult. Nevertheless, in a recent study (Meissel & Rubie-Davies, under review) examining different responses by cultural group in New Zealand to a motivation scale, the authors found that responses by Māori and Pākehā were more alike than different.

Younger students and those admitted to university directly from school were more externally regulated than older students and those admitted via the special admissions programme. It is more likely that younger students enter directly from school whereas older students often complete the special admissions programme before entering university and hence these groups are likely conflated. It seems from this finding that younger students gain more satisfaction from rewards than do older students who are perhaps more intrinsically motivated. A further interesting finding related to the special admissions students was that they had more grit than those entering straight from school. It may be that these more mature students have made a conscious decision to come to university and to change their life direction (there is evidence of this from the qualitative findings) and hence have more invested in being successful in their studies. Several also mentioned (see below) that study was a financial burden and so for that reason as well, they may have been more determined to complete successfully.

Conjoint students more so than science students were intrinsically motivated to accomplish. This means that they gained pleasure from doing well. At the time of completion of the questionnaire, some of the science students, despite achieving a GPA of 7.0 and above, had not been successful in making the veterinarian course and so were not feeling accomplished (as reported in their interviews). This may also explain why science students were more amotivated than education students; they were feeling confused about their future direction. It is likely that amotivation was confounded by considering site differences since the science students were located at Massey and many of the education students were located at Auckland and the differences were only between Massey and Auckland.

Qualitative findings

The qualitative findings will be presented for the Waikato and Auckland sites first followed by findings in relation to the Massey site. This is because the programmes the students were enrolled in were quite different for Waikato and Auckland (both education) and Massey (science). Following presentation of the interview data the focus group data will be presented.

Universities of Auckland and Waikato: Education

Student descriptions of themselves

Students described themselves as having high self-expectations and of being hardworking and resilient. For example:

> I have high expectations of myself. I am a conscientious person who loves learning new things. I love getting As. I enjoy exams, I like challenge. I put in the hard yards.

> I decided at 13 no one is going to look after me. I set rules for myself, no boys, no alcohol, no drugs, just study. Me in control of myself. Me choosing to do well in spite of everything. Me making a life for myself because I don't have anyone to fall back on.

Programme selection

Given the students in this section of the qualitative findings were in education, as might be expected, most were enrolled in the BEd (Teaching). However, there were also some who were BPE or B Social Work students.

Undergraduate story

Many of the students' stories were shaped by feelings of failure and early exit from school. Many students were surprised and delighted that they had been invited to participate in the study. In many cases families were the drivers with several students expressing a desire to make a better life for themselves and their children, like this student told us:

> …no one in our family is academic…and seeing my mum and dad struggle financially…I want to do something that no one in our family has done and try and break that chain.

Some of the students talked about working very hard for their grades, putting in long hours and really striving to understand the concepts in their disciplines. Achievement was attributed to hard work and a good set of study skills, as this student explains:

> I'm a hard worker, I'm organised, I see what needs to be done and I plan.

Things that have helped learning

Family support was mentioned frequently as supporting student learning, and this included parents, spouses and children:

> My parents are very supportive of what I do and although they can't help very much, you know they didn't really help much with my homework, but just them always, you know, being there.

> And my children are absolutely ecstatic. They are so proud of me and really encouraging. And it's like I can't let them down now.

> …just having family support really helps…they know I'm in the right place and they are really supportive so that's really helpful.

However, students were most likely to mention the lecturers and tutors and having a study plan as the things that most positively influenced their learning. They described lecturers

who made a difference to their learning as those who provoked inquiry and discussion, as these statements describe:

> …the ones who are really open and allow you to question and stuff; they are excellent.

> I've really enjoyed interaction with the lecturers and I really enjoy the lecturers that are willing to actually engage in conversation with you.

Things that have hindered learning

There was little commonality in the student responses about things that had hindered their learning. Examples mentioned mostly included challenging personal circumstances. For example:
One student had been abandoned by both parents at a young age, explaining that:

> ... my mum wasn't there; she had left when I was eight and I thought she would come back, she didn't come back so we [me and my sister] just raised ourselves.

Another student described financial constraints, which were not so uncommon among an older cohort of students, but this was different from what younger Sciences students reported as competing with their studies. As she told us:

> It's a big sacrifice for our family, our mortgage and all of that, everything because I don't get a student loan because I refuse to get more into debt so that's why I'm working and juggling it all. We have to. We need my income to pay the mortgage.

Another student was a working mother and had 35 hours a week work in two part-time jobs on top of her full-time study.

However, students also mentioned aspects related to their institutions which they believed hindered their learning. For example:

> There is always someone that lets you down and the others have to pick up the workload. Someone doesn't participate or contribute as much as others and you feel like you are carrying them through the assignment.

A lack of challenge or extension and lecturers who were unable to teach effectively were also mentioned by some students:

> I feel that much of the content is repetition. Also, I would have preferred to have had more useful and targeted feedback with examples of how I could have improved.

> I have been disappointed in one of the staff members who we thought we could rely on.

> Yeah and there's no sort of real rapport or anything really and then I thought well I'm an adult, what do you expect, you're not 10 anymore you know. But that was an interesting thing to find out, just that. You feel like you're on a treadmill of learning.

Some students appeared disappointed at the lack of programme flexibility:

> I just thought there might have been a lot more flexibility but there isn't, so that's been a reality for me that I wasn't expecting. … Like for me my break was, well there wasn't a break because maths finished and maths went on holiday and assessment for learning came back from holiday and it was just weird, you know the timetables were weird.

Further structural issues mentioned by some students included the effects of large class sizes and part time students being left out of the loop:

> One of my biggest struggles has just been being a number in a big system and not feeling a relationship with anyone really, with only a few fellow students where our paths have crossed many times, but part time it doesn't happen so much.

Feelings about being asked to participate in the study

Most students were very pleased, "proud" and "flattered" to be asked to participate in the study. It was "cool" and made them feel "appreciated" and valued as part of an identified group of high achievers. For some students, this was unexpected and they didn't realise their unique abilities until this recognition:

> I was quite flattered when I saw it [the email] but I didn't know it was so um, I thought a lot of students would have got the email as well until I went to the morning tea and realized there were only two other students in my year in my course.

They also appreciated information via the Moodle site, opportunities to gather and discuss, and the chance to participate in research and connect with the researchers. Another student specifically mentioned that one benefit was the opportunity to talk about long-term goals and plans, including postgraduate study.
However, a few students felt that being identified as a high achiever added pressure:

> Since I've been told, I have to try and keep that standard.

Some other students were reluctant to tell their peers, making comments such as:

> …it's been uncomfortable because I don't try and do well to get acknowledged for it or to be part of a programme like this, but it is really nice to know that someone has noticed that I am doing well and other people are trying to do well too.

Factors Contributing to Success

Factors that students mentioned as contributing to their success included being passionate and wanting the end result, being a hard worker, being organised, being interested in the programme, setting a standard and wishing to maintain it. For example:

> I think just interest really. Just being interested in it. Also getting good marks…now I've got that standard there, I personally have to uphold that now because I've set the standard for myself and if I do anything below that…

> I know it's about my personal goals in a way…I just wanted to do my best…I can't hand anything in if it's not my best…I guess that contributes obviously.

Massey University: Sciences

Student descriptions of themselves

"Focused", "goal setter", "driven", "hard worker" and "nerd" were some of the terms used by the students to describe themselves:

> I tend to work reasonably hard and get called a nerd throughout my studies but it pays off so I don't have a problem with it.

> I'm very focused, I'm quite motivated as a learner, I try to do as much as possible on my own but get help when I need it. I am very goal focused, like I like to have set things for myself and make sure that I achieve them and if I don't, I don't really enjoy that.

Almost all students were doing a double major and in their second or third year of study. All of the students discussed parents who were extremely hardworking although not all of the students had parents who had engaged in tertiary study.

Programme selection

Half the students had been Pre Vets, but they were all very happy to be studying their alternative programmes. Two of these students were still deciding whether or not to reapply for selection to the BVSc., as this student said:

> I'm doing zoology and ecology at the moment; I tried to do Pre Vet last year and missed out by like point three which is a bit gutting. But I am enjoying what I'm doing at the moment so I may or may not reapply for vet depending on how the tests go in the next little while as to whether I'm still getting the marks that I want to.

The remaining students were all pursuing a passion for their selected subject area, whether that passion had been sparked by a great teacher in high school or by a familial figure (father in one case and grandmother in another).

Undergraduate story

For the Pre Vets, their stories were shaped by feelings of failure and disappointment followed by acceptance of their alternative programme and then surprise and delight at just how much they were enjoying their courses. Those pursuing their passions were, not surprisingly, very happy with their choices and expressed their love of learning.

All the students talked about working very hard for their grades, putting in long hours and really striving to understand the concepts in their disciplines.

Things that have helped learning

Students were most likely to mention the lecturers, the course materials (e.g., Stream – the online learning platform, labs, study guides) and having a study plan as the things that helped their learning. Several of the students talked about people who were doing the same papers and the positive opportunities that provided for learning together. Students also spoke about applied learning as something that had helped them (e.g., a few students had experience working/observing work in 'real lab' and discussed the use of applied examples). The Library was also mentioned as a great resource for students. Some students said they would have been lost without access to previous exam papers.

Things that have hindered learning

There was little commonality in the student responses about things that hindered their learning. Examples mentioned included personal interests, having too many assignments due during the same week, large class sizes in first year, having a part time job, not having a study schedule, not having a study space at home, lecturers who were unable to teach effectively, being surrounded by people with lighter workloads, and partying too much.

Feelings about being asked to participate in the study

All of the students were very pleased ("stoked", "flattered", "honoured") at being asked to participate in the study mainly because they felt that it was recognition for their hard work. As one student explained:

> … people are seeing what you are doing and people are recognising that it does take a lot of work and people recognise that you don't just fly through it and get the As here and there, it's challenging and it is nice to be recognised for the hard work that you do …

With only one exception, the students were also quite surprised at the invitation because they either did not feel they were doing that well, or simply had not thought about their grades. Three of the students specifically mentioned that it felt good after their feelings of failure when they did not succeed in being selected for the veterinary programme.

College of Sciences support for learning

Support for learning provided by the College of Sciences was most likely to be expressed in terms of the learning resources (labs, tutorials, lectures, lecturers) provided in papers. The students specifically discussed their lecturers' roles of support:

> Most of the lecturers will let you talk to them whenever you need help. You just email them and most of them will email you back real fast.

> Definitely them answering my questions, cos I'm a conceptual thinker, I need to know why I'm learning something in order to absorb it. So yeah, that's why I ask them why does that happen?

Some students were very positive about the peer-mentoring programme and others also mentioned the Merit List. As one of the students explained:

> But one of things I enjoyed about one of my peer mentoring classes was one aspect of first year chemistry I struggled with but I remembered how I best learned it so I tried to teach it the same way to them and a few of them actually got it and I felt really good about that. Using my experience and how I learned it to explain it a bit better. It's definitely been an eye-opener and it's been very helpful.

College of Sciences encouragement toward postgraduate study

None of the students had received anything official from the College but *all* of them were already considering postgraduate study and were at varying stages of the decision-making process. A few students noted that postgraduate study had occasionally been mentioned in class.

Several students specifically discussed their desire for more information about postgraduate study and four students talked about their efforts to solicit information from staff about their options. In every case, these efforts had been unsatisfactory with staff telling them to 'come

and see them later in the year' or providing the students with vague or general information that did not specifically address their interests.

Main factors contributing to academic success

Almost all students mentioned their focus and drive to do well as the main factor contributing to their success. Several students talked about their strong work ethic and some students mentioned their prior experience and success with examinations.

Ideas for rewarding and recognizing Top Scholars

Discussions with the students on this topic clustered around three main themes.

Rewards: Several students discussed the idea of being able to receive rewards for their hard work. This was expressed in terms of anything that would look good on their CV:

> Having something you can put in your CV to say that this person has done brilliantly in our college just makes you a little bit more employable.

A few students mentioned the provision of scholarships as a reward for top scholars.

Mixers: Several of the students spoke about the morning/afternoon tea as an enjoyable mixer event that provided an opportunity for them to get together with each other and with staff in an informal setting. However, it seemed that students would have preferred that the event have some structure or purpose such as meeting other people studying similar topics or exploring themes such as postgraduate opportunities or "life after study".

Optional Extension Activities: Students noted that access to optional extension activities—specifically applied learning experiences—would be welcomed by top students who were succeeding in their studies and looking to augment them with practical/work experience.

Focus group data

Five students who were involved in the programme at Auckland were invited to participate in a focus group. Below is a summary of that meeting.

Students mentioned that the interview that occurred early in the study had made them think carefully about how well they were doing and about their future prospects:

> It did make me think about what I wanted to do with my grades; that were above average and I didn't know that they were above average... , I didn't feel like I was a star student.
>
> After being part of the interview process I realised that I might be a little bit higher than I thought.
>
> I've come away thinking that there are other opportunities.
>
> I never even thought why you'd do postgrad. Why would you go back and study? You can get a job now. The interview is the first time that I actually thought about doing postgrad at all.

Students had enjoyed being part of the intervention saying that they made like-minded friends from meeting others at the morning tea. Previously they had not known who was doing well in their group and who was not. They felt that it was now okay to talk about grades to the people they met at the morning tea because they knew they would not be putting their foot in it. They believed that the study had “built collegial relationships within the course".

> It was a terrific feed! But it was actually really good being able to see some of the other people in the course who, you might have seen their faces, but you didn’t know that they were actually a similar level to you. It actually did help with bonding with people.
>
> A lot of my Uni friends I completely get along with, but they are always thinking ‘oh I’ve got this amount of points in this paper, what is the minimum amount of points that I need to pass the course?’ And I have a completely different mindset. So I think it was interesting seeing other people who also had a personal like intrinsic motivation to want to do well

Students expressed a range of views related to having been identified as high achieving students in relation to other friends and other people in their courses:

> You don’t want to come across as being bragging too much. Sometimes, because you might have friends who are struggling, and you don’t want to make them feel bad that if they’re struggling to pass, and yet you’re getting excellent.
>
> I know in high school, I hated getting awards at assembly. I got a bit of stick for being one of the smarter kids. I know it’s not the same at university but still it’s still a stigma.
>
> I think I do accept that I am a top achieving student now. I still don’t brag about it but I have more confidence in that I am a top achieving student, whereas before I was like oh yeah I get As sometimes, most of the time, but now it’s like well I actually am identified in this category and I’m not afraid to say it to my family but I wouldn’t brag and say it to others.
>
> You get people who go ‘oh what did you get in the assignment?’ and then when you say that you did well, they kind of are quite angsty against you about it. It’s like well if you didn’t want to hear about people doing well why did you ask when all you wanted was to hear everybody had a tough time and they can commiserate with them?’

Another viewpoint evident in the focus group was that the students felt more comfortable now about seeing themselves as "top achieving students". This identification had reinforced the students’ beliefs in their own ability, and so they said they were now more willing to share work and help others. Nevertheless, the students were not accepting of the 'gifted' label, but thought they could live with the 'talented' label although it was suggested that it sounded like something out of a Miss Universe Contest! Students expressed feelings of setting themselves up to be ridiculed or “got at” if they called themselves gifted. Overall, they felt more comfortable now with the idea of being at the top of their cohort, but they preferred the "top-achieving” label.

The students said that they appreciated being invited to the seminars, but none of them had attended due to late notice of some of the more interesting ones. Sometimes the invitations arrived only the day before – but they wanted to still be notified of them next year, even after they have graduated and had begun work.

The students felt the questionnaire at the beginning of the year was very long although one member said she really enjoyed filling it in. Another said the questions had made her think about herself.

Because of being part of the intervention, most had begun to think about postgraduate study and particularly after the interview. The only student who was finishing her undergraduate study this year, had enrolled for honours next year, and said, "The interview was the deciding factor" for that. Others were seriously thinking about moving to postgraduate study immediately after completing their degrees but at the time of the focus group they were only finishing their second year.

Some students thought that the study would have had more mentoring for them. They were used to being mentors but wanted to be mentees. There was some discussion about the value of the person in the faculty who helped the Māori and Pasifika students and also helped out the PE students "with everything". "I love her!" The B.Ed students said they did not have someone to go for advice.

All but one of the students were currently in mentoring roles or were student reps, so they were giving service to faculty. Some mentioned that their mentoring was received in silence. That is, they did not feel as though they were getting feedback from their mentees.

There was a suggestion that the initial approach for the study should have come with the name of someone they knew, like the Head of Programme, so that they knew not to delete the email. By using the name of someone like the Head of Programme, the students would have been familiar with the person and would have then known that the email was important. Because the email came from someone they were not familiar with some wondered if they should really be at the morning tea and were nervous about walking in, in case they should not be there. They thought this may have been a factor in why fewer attended than were invited:

> Student
> Stuart someone comes up on my phone a lot.
> Researcher
> He’s the Vice Chancellor.
> Student
> I don’t really know what that means - but I am assuming he is really high powered.

There was a suggestion that short presentations from postgraduate students during the morning tea would have been of interest. The focus group facilitator informed them that we had had one student present during the second morning tea in phase 2 of the study. The students thought that that would have been a good idea.

"Recognition" was what the students appreciated most in this study. They agreed that this acknowledgement had kept them working at a high level. They did not want to drop their standards now that they had been identified and had been recognised. They did not appreciate the other faculty emails so much about high marks in specific courses, because

they were identical each time and not personalised. They reported being enthused with the first email, but then explained that they later ignored them. The students thought almost everyone got those letters. Being in this study gave them more pleasure because they realised they had been specially selected. Their families also appreciated that they were in the study. One student reported having four late assignments after her Poppa died earlier in the year, and her mother was concerned that she would be dropped from the intervention group! The quotes below are representative of the student views about how they valued the acknowledgement that came with being identified as high achieving:

> The recognition and acknowledgement about our success.

> The recognition from it, that I am actually doing really well, has been really meaningful for me.

The focus group facilitator informed this group about the Moodle page that Waikato had set up. The students thought that the Waikato idea, open to only the group, was a great idea. A useful discussion ensued about why they would not be comfortable with being in a photograph of 'talented students' if it was on the general faculty website. The reasons given seemed to go back to negative experiences at school, if they showed they were bright:

> I think if you asked to take photos of us and create a website, I would have still gone with it, but I wouldn't have been the first. Like yeah go take a picture of me now. I wouldn't have been super excited. I would have been a bit reluctant. And I was just thinking about my reason for that and I think, I don't know, it just seems a bit funny to have a profile, to ring your own horn, but if it's within a certain group it's different.

> You wouldn't want your picture on the university page saying this guy is… [talented]

It was suggested that postgraduate students who wanted to showcase their work or practice presenting, could offer the opportunity to the 'talented group' via the Moodle or Facebook page. In this way it could be a win-win for both groups.

All students were very interested in reading the write-up of the study.

Final survey data

A small group of students (*n* = 27) also responded to a final survey to evaluate the intervention. This quantitative data was a means of verifying responses within the focus groups. There were spaces for students to make comments following the quantitative questions.

Students were asked if they had enjoyed being part of the project; 96.3% said that they had. Typical comments were:

> It has helped me better understand what it is that enables me to succeed. Great to meet other like-minded people, and it is just nice to have my hard work recognised.

> I have really enjoyed the recognition of high achievement that has gone along with the project, it is great motivation to continue.

> This has been a very cool experience. Having the options to hear people speak about how they have achieved and inspire us to do the same. It was also very valuable to meet with other high achievers at the university.

The students were also asked if they had attended any of the professorial addresses or seminars to which they had been invited. Only 27% had taken advantage of this opportunity. Comments included:

> Have been keen to attend but just timing and distance from home have made it not possible so far. Am keen to keep receiving information and will endeavour to get to presentations when possible. Would love to have something in [distant campus].

> Not all the ones I wanted to, because of schedule clashes or assignments overload, but the one I attended was of value to me.

> I found these to be motivating and encouraged me to think of what else I want to achieve, and where I see myself in the future.

A further question related to whether or not students had kept in touch with people that they had met as part of becoming someone in the intervention. Although the students did not really know each other before, 34.6% said that they had kept in touch. Typical comments were:

> There was one fellow student in my course who I see often in classes. We do chat occasionally about particular papers and have talked about post grad studies.

> Some of the students are in classes with me and it is useful to know who it would be beneficial to discuss things with.

> I have not kept in contact with other members. It could be helpful to create a blog post or facebook for members to contact each other.

Students were also asked if they had either mentored others or been a recipient of mentoring themselves. Of those who responded to the questionnaire, 40% answered “yes” to this question. Responses included:

> Yes-I am in my second year on being a FYE [First Year Experience] mentor and love it.

> No. This would have been something I would have liked to have myself. Especially to build self-confidence.

The final question in the survey related to whether as a result of being in the intervention, students were now intending to continue to postgraduate study. More than three-quarters (76.2%) reported that they now intended to continue with their studies:

> I plan on completing my masters specializing in an area such as dyslexia, gifted and talented-ness, twice exceptionalism. I want to move into the area of research and specialist programmes at some time in my career.

> At this stage I just cannot wait to get into the field of teaching and put my degree to practice. Maybe further down the line after a few years of actual teaching.

Conclusion

The intervention was carried out across three universities in this study, was easy to implement and cost-effective. Overall, it appeared that the intervention was appreciated by students and was effective in having them consider future postgraduate study. The students identified as high achieving were appreciative of the recognition that identification brought. Some had connected with other high achievers and should the intervention continue in future years, then it seemed likely that these relationships would be extended. Students who were identified came from a variety of backgrounds. The inclusion in this group appeared to bring with it some prestige with students becoming motivated to keep their grades up in order to remain in the group. Further, although not reported above, emails were received from other students who wished to become part of this group and were inquiring as to how that could happen. The success of this intervention across first one institution and now across three, signals its viability and usefulness. The extension to other sites is recommended.

Limitations to the study

Some aspects of the intervention were not as well advertised as they might have been. This resulted in lower levels of participation than might otherwise have resulted. For example, although students were invited to professorial addresses and seminars, often these invitations went out too late for students to be able to attend. Similarly, the opportunity to work alongside other academics on research projects was not extensively advertised. This meant that students who did become involved mostly only did so via the summer scholarship programme. Research projects in which the talented students could become involved is something that could be regularly advertised on the Moodle page that became a feature of the Waikato programme. It need not be only once per year.

A further limitation of the current study relates to generalisability of the results. Because the data are largely qualitative, generalising the findings to other sites in New Zealand needs to be done with some caution. As the results showed, the education students often had quite different views to those of the science students. This may extend to other faculties at universities in New Zealand. Further, some faculties will already have structures and processes in place to support their high achieving students and so may not be interested in the results of this study. The findings and the effectiveness of the intervention pertain most to faculties or schools where there is currently no support offered.

Recommendations and guidelines

As perceived by staff and reported by students, the intervention was successful in a number of ways. Through the morning/afternoon teas, the talented students became aware of other similarly successful peers and created their own learning and support groups. They could share their success in these groups. These events are inexpensive but very useful in creating support networks for talented students. Students felt able to enjoy their success with other high achieving students rather than covering up their results as they had done previously. However, it is important that students realise the significance of such an invitation when it is first distributed. Such invitations would be more positively received from senior staff members rather than those conducting a research project. Further, students suggested having some postgraduate students present their work at these events. They believed that such presentations would be of interest to them and could inspire them to move into postgraduate study themselves.

The congratulatory letters were appreciated not only as recognition of hard work and persistence but also as a useful addition to the students' CVs. However, the significance of these letters needed to be clearer because at least one student initially discarded hers thinking that everyone received one. One suggestion is that all students are made aware that high achieving students will receive recognition via these letters. A statement could be added to course booklets, for example, so that all students were aware. There was also a suggestion from the students that such emails and letters should come from a senior staff member, for example, the Associate Dean Teaching and Learning or the Head of Programme.

Some students had attended academic seminars and presentations. However, at times they did not receive timely advice of these. If these intervention strategies were to be initiated in other institutions, it would be wise for the talented students to be added to any databases or list-serves that disseminate advice of such seminars in order to ensure that the talented undergraduate students were informed in a timely manner.

Many students were keen to be involved in research projects alongside academics. However, it did not seem that this provision was made as visible to students as it could have been. At the end of the intervention, many of the students reported being keen to continue into postgraduate study. The opportunity to work alongside an established academic in a research project is an excellent opportunity for such students to discover whether they would be interested in further study or in advancing an academic career. Such students could work as research assistants not necessarily paid, but simply for experience. It would seem that academics could also be keen to involve such students, particularly if there was no cost involved. In order to promote this idea, academics need to be made aware that such students would be keen to be involved. This could be achieved through a staff email or even an announcement in a staff meeting. Staff could post advertisements on a Moodle or Facebook page dedicated to the talented students (see below).

Some students did become involved as academic mentors to other undergraduate students. This involved providing clarity around what was expected in assignments, feedback on draft assignments, information about how to study for examinations, suggestions of readings, and so on. Students who did engage in this opportunity reported that they had enjoyed the experience and that in many instances it had increased their own understanding about concepts when they had to explain them to others. Again, this is an opportunity that can be paid or unpaid, depending on budgets. The opportunity appeared to be valuable for both the talented students and the mentees.

There was a suggestion from some students that they would have liked to have been mentees. Several reported that they would have liked information about postgraduate study early in their undergraduate courses to facilitate future planning. Further, the opportunity to be involved in research projects would provide mentoring for high achieving students. A further possibility is that a staff member assumes the responsibility for the high achieving students and this, could manage the Moodle (or Facebook) site (see below) and could also become a key support person for this group of students.

In one of the institutions, a Moodle site had been set up specifically for the students identified as talented. This was extremely successful and could be particularly useful in institutions where the students were learning by distance or where campuses were spread out. Again this page put students in touch with each other so that they could get to know each other and provide support for one another. Further, such a page could be used to advertise positions working alongside academics, events and meetings specifically for this

group, and academic seminars and presentations. Because new students would become part of this group each year, it could also be a place to welcome them. Further possibilities suggested by some students were to have a blog or a Facebook page.

Although the current study used grades to identify the talented students, it is acknowledged that other criteria for inclusion could also be used.

Outputs

Currently, there have been only two outputs from this project:

Rubie-Davies, C. M., Millward, P., Wardman, J., Bicknell, B., Ballam, N. & Riley, T. (2014, November). *What about our talented students? Phase Three.* Presented at Regional Hub Project Symposium, AKO Aotearoa, Auckland, New Zealand.

Millward, P., Wardman, J., Rubie-Davies, C. M., Bicknell, B., Ballam, N. & Riley, T. (2015, June). *Supporting talented undergraduate students.* Presented at Projects Alive! Presented at Northern Hub Colloquium, AKO Aotearoa, Auckland, New Zealand.

This is because the project only finished at the very end of last year and data entry was only completed this year. Further quantitative analyses than those reported here may be undertaken and there the qualitative data is now being analysed by professional coders. The team recently met and the following outputs were planned:

- An abstract submitted for the World Council for Gifted and Talented Children Conference 2015
- Articles for gifted and talented education and higher education journals

The abstract has been accepted for presentation at the World Council for Gifted and Talented Children Conference and Tracy Riley and Brenda Bicknell will be representing the group.
There has been some success by team members in accessing further funding to enable robust coding of the qualitative data in preparation for beginning to write articles to submit for publication. This coding is now underway.

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