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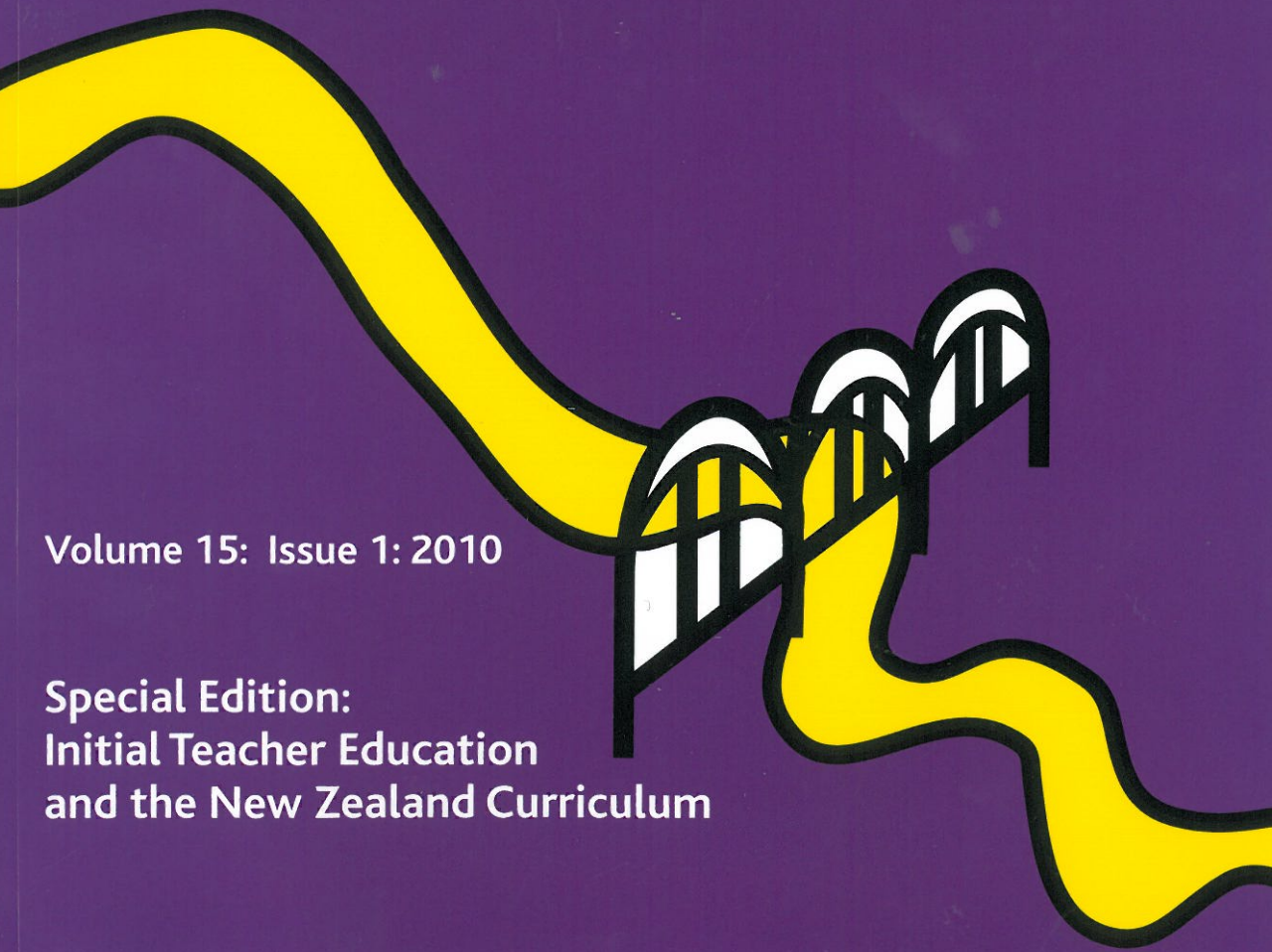

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## Special Edition:
## Initial Teacher Education and the New Zealand Curriculum

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# STUDENTS' PERCEPTIONS OF THE EFFECTIVENESS OF PRE-SERVICE TECHNOLOGY COURSES

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**Abstract** *The merger of the Auckland College of Education with the University of Auckland led to the development of new teacher education programme qualifications. Technology education was given less time within these programmes. In the period 2006–2008 this challenge was being faced and there was also the need to prepare student teachers for the current 1995 technology curriculum which they would be expected to follow on practicum, and the revised 2007 curriculum which they would be using early in their teaching careers. As previous research of beginning teacher perceptions of the effectiveness of their programme in preparing them to teach technology had played a significant part in refining the previous technology education courses, the technology education staff were interested to find out how effective the new courses were. The object of this research was to investigate student perceptions of their knowledge of the 2007 curriculum, and their level of confidence in teaching technology. Participants completed an anonymous questionnaire at the end of their university programme, and self selected students were also interviewed. This paper discusses the initial findings from the first set of data collected at the end of 2008.*

**KEYWORDS**

Technology curriculum, teaching

## THE ISSUE UNDER INVESTIGATION

In the late 1990s the lecturers in the Centre for Technology Education in the Auckland College of Education were faced with the challenge of preparing students to teach in a new essential learning area while writing and implement courses for a new Bachelor of Education (BEd) programme. For a number of reasons (Grudnoff & Tuck, 2005) the initial graduates from the new programme felt ill-prepared to teach technology. In 1999 only 16% of beginning teachers felt "very well prepared" and 31.9% regarded themselves as "not well prepared" to teach technology. This feedback inspired a major revision of both pedagogy and course content and by 2004 43.6% now felt "very well prepared" and only 5.5% "not very well prepared" to teach technology (Grudnoff &Tuck, 2005).

A similar situation to that of the 1990s faced technology lecturers after 2006 as a revised technology curriculum (Ministry of Education, 2007) was introduced at the same time as totally new Bachelor and Graduate Diploma teacher education programmes were implemented as a result of the merger of the Auckland College of

Education with The University of Auckland. In view of the initial problems experienced previously the technology lecturers felt it important to monitor graduating students' perceptions of the new courses. All six technology education lecturers are part of the research team, and funding for the research has been provided by the University of Auckland Faculty Research Development Fund.

## THE METHODS USED TO INVESTIGATE THE ISSUE

The research aims to document primary and secondary student teachers' perceptions of their readiness and capability to teach technology at two points in their early teaching career. The first occasion was as they graduate from their initial teacher education programme. The second will be toward the end of their second year of teaching as provisionally registered teachers (PRT). The purpose of the second phase of data collection is to see whether their perceptions of the value and relevance of their teacher education programme have changed and also to identify the level of support they have experienced as PRT. It is a longitudinal study with the first data collection from graduating students beginning in 2008 and the final data collection from second-year PRT occurring in 2012. A mixed methods approach is being used. The mixed methods design chosen can be defined as a "Sequential Explanatory Design" (Creswell, Clark, Gutmann, & Hanson, 2003). The mixed methods researcher in this design typically collects quantitative and qualitative data sequentially in two phases. An explanatory design consists of a first phase with the collecting of the quantitative data and then follows with the collection of qualitative data to help explain the quantitative results. The quantitative data gathered from a large group of student teachers will provide rich data about the perceived effectiveness of pre-service education, while the qualitative data will provide a more in depth explanations for the patterns identified from the quantitative data (Creswell, 2005).

The first stage (quantitative) surveyed pre-service student levels of confidence for teaching technology. All end of year graduating pre-service students in primary and secondary teacher education programmes were asked to complete an anonymous questionnaire. There were two distinct cohorts in the B.Ed group, those who had completed the compulsory paper in the first semester of the three-year programme (BE1) and those who had also completed an optional science and technology integrated paper in the final semester of the three-year programme (BE2). This first stage questionnaire provided data with regards to their perceptions of the usefulness of pre-service experiences in technology education and their own understanding of the 2007 curriculum and appropriate planning and assessment processes for teaching technology.

The questionnaire had four sections. 1. Twelve questions related to understanding of the 2007 technology curriculum; 2. Five questions focussed on their preparedness to teach technology; 3. Four questions related to their confidence to plan and assess technology; 4. Three questions related specifically to the secondary school context and were answered only by students in the Graduate Diploma in Teaching (Secondary) programme. The responses were recorded on a 6-point Likert scale (very poor, poor, slightly good, good, very good, excellent).

The second stage of the research (qualitative) was intended to further explore findings emerging from the analysis of the data collected in stage one of the research. Eight self-selected participants were interviewed at the end of their University of Auckland teacher education programme. The interviews were semi-structured and covered the first three areas in the questionnaire. These students will be re-interviewed toward the end of their second year of teaching.

## A BRIEF REVIEW OF RELATED LITERATURE

Technology educators are facing major challenges as they prepare to meet the demands of the revised curriculum contained in the recently gazetted *The New Zealand Curriculum* (Ministry of Education, 2007). There is a solid body of literature (e.g. Compton & Harwood, 2003; Jones & Moreland, 2004; Moreland, Jones, & Northover, 2001) which clearly documents the problems that teachers and tertiary technology educators faced in implementing the first technology curriculum (Ministry of Education, 1995). These difficulties have also been experienced in other countries as they introduce technology into the compulsory school curriculum (e.g. Finger & Houguet, 2007; Potgieter, 2004; Sade & Coll, 2003).

Initial teacher educators face many challenges in preparing generalist and specialist beginning teachers to meet the demands of confidently and effectively teaching technology. Often student teachers have inappropriate constructs of the nature of technology and technology education that must be addressed (McRobbie, Ginns & Stein, 2000). These constructs have a marked influence on the way in which technology is planned for and taught (Davies, 2003). A lack of confidence of their ability to teach technology affects teachers' ability to address cultural diversity within the classroom (MacLeod-Brudenell, 1996). The wide-ranging nature of technology poses problems with regard to teacher content knowledge (e.g. Barlex & Rutland, 2003; Loucks-Horsley, 2000).

As initial teacher educators we are concerned to provide the most effective programmes to our student teachers. While our newly-developed programmes are research-based, we felt it was important to get feedback from the students and teachers who have experienced these programmes to better meet the needs of future student teachers.

## FINDINGS RELATED TO THE ISSUE

There was a disappointing return of the student questionnaires. Only 46 (21%) of graduating students returned completed forms, made up of 12 one paper (BE1) and 15 two-paper (BE2) Bachelor of Education students, 14 Graduate Diploma—Primary (PGD) and 5 Graduate Diploma—Secondary (SGD) students. This was due in some part to a delay in obtaining ethics approval and funding which meant that over half the students were already on their final practicum at the time the questionnaire was administered and these had to be sent to the schools they were in rather than being handed out in course time. As there were no significant differences in the responses of the BE2, PGD, and SGD groups, this paper will pay particular attention to the responses of the BE1 and BE2 graduating students to the initial questionnaire and interviews.

Twenty-six students (57%) of all four groups combined felt they had a good or very good knowledge of the technology learning area in the New Zealand Curriculum (Ministry of Education, 2007). Only six (13%) rated themselves as having a poor understanding, four of whom were from the BE1 cohort. BE2 students were twice as likely to rate their understanding as good or very good than BE1 students.

With regard to their understanding of the three strands within the technology curriculum the students rated themself higher for the components of practice strand, particularly brief development (75%) than for the nature of technology strand (55%). Their understanding of the technological knowledge strand was more varied, 66% rating their understanding as good or better for technological products, but rating their understanding of technological modelling and technological systems at 50%. Again, the BE1 group rated their understanding considerably lower than the other groups at 43% for components of practice, 25 % for the nature of technology strand, and only 17% for the technological knowledge strand.

There was one area where the BE1 rating was higher than the BE2 rating. The BE1 students were slightly more positive about the contribution of course readings to their understanding of technology and technology education with 50% rating this as good or better compared to a 40% rating of the BE2 group. However, the development of a site called Techlink and lecturer reference to it since 2007 was clearly evident in the responses to the question regarding online support material, 73% of the BE2 group giving a good or better rating to the site's contribution to their understanding of technology and technology education compared to the 25% rating of the BE1 group.

Twenty-five of the 46 students (54%) rated their course as good or better in enabling them to form links between theory and practice, including two who gave an "excellent" response. One of the "excellent" responses was from a member of the BE1 group. However, overall the BE2 group was twice as positive about this than the BE1 group.

Less than half (48%) gave a good or better response to the question asking how well they had been prepared to teach technology. There was greater difference in the responses of the two groups to this question compared to the previous question related to links between theory and practice. While 40% of the BE2 group gave a "good" or better response only one of the twelve BE1 respondents did so.

The responses to questions on their degree of confidence in being able to provide environments which encouraged authentic experiences, experiential learning, and understanding of the interrelationship of technology and society were much more positive, ranging from 70-74%, although again the BE1 responses were considerably lower at 33-50%. The B.Ed students' rating of the value of their practicum experiences in preparing them to teach was low for both groups, 33% for BE2 and 25% for BE1. For both groups the most common response was "very poor".

Neither group felt very confident about planning and assessing technology, although at 45% the BE2 group again were much more confident than the BE1 group (25%). Neither group responded positively to the question asking how well

they had been exposed to a range of appropriate assessment strategies for technology in their courses, only 25% of both groups rating this as "good" or better.

Although 14 students had consented to be interviewed difficulties in tracing them and setting up the interviews meant that only eight interviews were completed, one BE1, 3 BE2, two PGD and 2 SGD students. The semi-structured interview (Appendix 2) sought to gain some insight into student background and experience in the course.

## DISCUSSION OF THE FINDINGS

The very different level of knowledge of the curriculum and confidence to teach technology between the two Bachelor of Education groups might have been expected in view of the fact that the group with the higher ratings had done a second paper, which they had just completed when filling in the questionnaire, whereas the other group had only completed one paper two years previously.

A second factor that would have impacted on this is that the one-paper group completed their course in semester one 2006, at which time the revised curriculum was still in its development stage, the draft curriculum (Ministry of Education, 2006) coming out just after the course finished. This group had been informed of the proposed changes to the 1995 technology curriculum (Ministry of Education, 1995) as members of the teaching team had been involved in the revision process, but the main emphasis in the course was still on the nature of technology incorporated in the 1995 document. The confusion felt by the students in that cohort clearly emerged in the interviews. Mary expressed said,

> ... we were based on the old curriculum but then we kept referring back to the draft curriculum so I think that first year was very confusing, hey we've got this technology curriculum but we don't know which one. I remember when it came to the exam we were still confused which one we should quote in the exam, the old one or the new one which I don't think future people will have that confusion. (Interview, BE2–1)

Some students for whom this was their only technology education paper did see some benefit in this,

> ... and we basically unfortunately got about half way through it and they decided to change from the old curriculum to the new one which had a massive impact for some of us. Some of us found it quite difficult to change what we'd already learnt and do something new but I think it was a good decision to make because at least we've got some understanding of the new curriculum whereas if they'd just stuck with the previous one we would have no idea. (Interview, BE1–1)

The questionnaire in 2008 only asked these one-paper students to rate their understanding of the 2007 Technology curriculum, which they may not have seen or investigated. While this may influence the findings regarding understanding of the curriculum it would not have influenced their ratings with regard to confidence

to plan, teach, and assess technology to the extent shown in the questionnaire responses. It is of concern that while completing a second paper increased student's understanding of technology and technology education, it did not increase their confidence in planning and assessing for technology.

Despite the probable affect of the transitional period of the technology curriculum the low self-reported ratings of this one-paper group is still a cause for concern and I believe may indicate the impact of the move from two compulsory technology education papers in the earlier Auckland College of Education degree to one compulsory paper in the University of Auckland degree that replaced it. The impact of having a course with some technology focus in the final year of the programme was clear in the interviews with the BE2 students.

> … because it was first semester, first year the whole idea just actually getting to grips with well for me being back at uni, and I suppose at that point in time we didn't necessarily have the basics for like planning and you know all that kind of stuff so kind of learning that in conjunction with actually what you need to know for technology there was so much to actually take on board and I don't actually feel like I came out of that course really knowing all that much about technology. In terms of the second paper, yeah it all started to make a bit more sense I suppose actually having that second shot at it because all of a sudden you started to remember you know just terminology and like technological outcomes and technological products and for purpose and all that kind of stuff and you actually start thinking oh yeah that actually ties in with what we did last time kind of thing. I enjoyed the fact that some things started to click which was good. (Interview, BE2–2)

In the light of the 2008 student course evaluation the compulsory paper was modified in 2009 to give a greater emphasis on planning and assessment. As in 2009 the focus was also completely on the 2007 technology curriculum and it is expected that when the 2009 intake are questioned in 2011 their levels of knowledge and confidence will be higher than the 2006 intake reported in this paper.

A common element of the compulsory Bachelor of Education (Teaching), Graduate Diploma in Teaching (Primary), and Graduate Diploma in Teaching (Secondary) courses is the requirement on students to carry out a technological process and produce an outcome which is part of an assessment task for the course. Student perception of the value of this process varied quite dramatically. Students interviewed tended to be either very positive or very negative. For example, Sally

> I think it was just the fact that we went through and developed our product ourselves. I think that was really helpful because it also gave me an insight into just the way people think when they're constructing a product and the different thought processes that are involved. (Interview, PGD–1)

Lily also saw the activity in a very positive light

> going through the process that the children would go through was quite valuable, like actually going ahead and trying to make a product, like you think about it when you're doing it. (Interview, BE2–3)

On the other hand Holly response was negative. She said

> I know so many people stressed so much about the project. Just the fact that it was 70% and I don't know if mine is good enough but the technology, you know the point of the assignment got lost. (Interview, PGD–2)

Mary was even more negative about the product development, saying

> we proceeded to do useless things. They weren't finished. It was all rushed so I kept thinking we do want children to make something which is useful that they're going to keep forever and here we are, I've made useless stuff for this whole course. (Interview, BE2–1)

## CONCLUSIONS, IDENTIFICATION OF GAPS NEEDING FURTHER STUDY, IMPLICATIONS FOR ITE

Although the sample was smaller than intended the results of this first application of the graduating-teacher questionnaire has indicated some areas of concern that the technology staff are working to address. The Auckland College of Education B.Ed comprised 36 ten-credit papers. The University of Auckland degree that replaced it contained 24 fifteen-credit papers, although the teaching time for each paper remained the same. Strong concerns about the loss of curriculum subject papers were raised at the time the degree structure was established, in the process of which the third year compulsory technology course from the previous programme was lost. The evidence from the initial data collection in our research indicates a dramatic impact of moving from two compulsory papers to one in the B.Ed programme. Feedback from our graduating B.Ed students indicates that it is rare for them either to see technology taught or to have the experience of teaching a technology unit while on practicum. In light of this it seems to demand a great deal of our students to expect them to be able to retain and use the knowledge gained in the first semester course of a three year programme in their beginning teaching position. The cutting back of subject courses focussed on the curriculum learning areas appears to be a common factor in recent tertiary pre-service programmes and this trend has serious implications for the quality of student teacher education.

There is some evidence of the importance of teacher content knowledge in quality pedagogy (e.g. Farquhar, 2003). The reduction of subject content focussed courses in student teacher education programmes would seem to be a major weakness. A case could be made for a return to a four-year teacher education undergraduate degree as was the case for most teacher education programmes in the early 1990s. A second paper in all curriculum areas later in the programme would improve a beginning teacher's ability and confidence to teach technology and benefit other marginalised subject areas such as science and the arts. A four-year

B.Ed programme would also bring New Zealand into line with international trends in student teacher education.

Although the overlapping of two quite different technology curriculum documents had a strong influence on the one paper Bachelor of Education group's understanding of the 2007 curriculum, their lack of confidence to plan and teach technology needed to be addressed. Some changes to the compulsory paper have already been made. In particular an independent, student selected product making activity has been replaced by a lecturer led unit of technology which models and explains best-practice planning, teaching, and assessment in technology. Some early evidence suggests that this change is having a positive affect. University of Auckland student course evaluations carried out at the end of semester one 2009 showed a marked increase in the level of student satisfaction with the course compared to earlier years. The results from the 2009 questionnaires may show some improvement in the ratings of the BE1 2007 intake because in that year there was a much greater focus on the 2007 technology curriculum than had been the case for the 2006 intake documented in this article. It will be 2011 before the long term results of the initial changes will be known.

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**APPENDIX ONE – QUESTIONNAIRE- COMMON QUESTIONS**

**Courses**
**Which Technology education course(s) have you completed?**
EDCURRIC 107 EDUCURRIC 303 EDCURRIC 612 SECONDARY

***Curriculum***
**(NOTE: responses were on a 6-point Likert scale)**

**How would you rate your knowledge of technology as learning area contained within the NZC 2007 ?**

**How would you rate your understanding of the components of the Technological Practice Strand?**

- How well do you understand what is meant by Brief Development?
- How well do you understand what is meant by Planning for Practice?
- How well do you understand what is meant by Outcome Development and Evaluation?

**How would you rate your understanding of the Nature of Technology Strand ?**

- How well do you understand what is meant by characteristics of technology?
- How well do you understand what is meant by characteristics of technological outcomes?

**How would you rate your understanding of the Technological Knowledge Strand?**

- How well do you understand what is meant by technological products?
- How well do you understand what is meant by technological modelling?
- How well do you understand what is meant by technological systems?

**How well do you think the readings from your course contributed to your understanding of technology ?**

**How well do you think the readings from your course contributed to your understanding of technology education?**

**How well do you think the online curriculum support material contained on Techlink has increased your understanding of Technology and Technology Education?**

***Pedagogy***
**How effectively has this course enabled you form links between theory and teaching practice?**

**How well do you think you've been prepared to teach technology?**

- How confident do you feel in your ability to provide environments which encourage authentic learning experiences for students?
- How confident do you feel in your ability to provide environments which encourage the development of experiential (hands on) learning?
- How confident do you feel in your ability to provide environments which encourage the development of tacit understandings in relation to Technological Practice?
- How confident do you feel in your ability to provide programmes which develop an understanding of the inter-relationship between Technology and Society?
- How well do you feel your practicum experiences have prepared you to teach confidently in this learning area?
- How well do you think this courses experiential (hands on) learning activities have contributed to your understanding of technological practice?

***Planning and Assessment***

**How well do you think this course has prepared you to plan for authentic technological learning experiences?**

**How well do you feel your planning will incorporate the characteristics of teaching and learning in technology?**

**How well do you feel you will be able to use the 'indicators of progression' for assessment purposes?**

**How well do you feel you have been exposed to a range of appropriate assessment strategies for technology?**

## APPENDIX TWO

**Interview questions for pre-service teachers**

- Could you tell me something about your background/experiences prior to entering the teacher training programme?
- Will you briefly describe the course(s) you have completed as part of your teacher education programme.
- What parts of the course(s) did you enjoy? why?
- How would describe your understanding of the 2007 NZC Technology statement?
- Do you feel prepared for teaching technology eduction? Why? Why not?
- What elements of the course helped you feel prepared?
- In your opinion are there any parts of the course you would like to change? Why?
- How would you rank your readiness/confidence to teach technology with other ELA's?
- What support would you expect to get as PRT?
- Would you like to make any other comments?