# Beginning teachers: How their pre-service technology training has assisted with their practice

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## Introduction

Beginning teachers are faced with many challenges when they embark on their careers (Goodwin & Judd, 2005; Grudnoff & Tuck, 2001; 2003; 2005; Lang, 2001), and these challenges impact on how well they are able to effectively teach particular curriculum areas. The technology curriculum is a relatively new area where developments are still occurring, and this further impacts on the implementation of effective technology units by beginning teachers (Hansen & Lovedahl, 2004; Stein, Ginns, & Mc Robbie, 2003). It is therefore imperative that preservice education programmes provide teachers with the appropriate tools to effectively teach this developing subject (Grudnoff & Tuck, 2001). The focus of this research is to determine how useful beginning teachers found the technology training provided by a large New Zealand university in preparing them for classroom practice.

## Background

Technical education was introduced into the NZ school system in 1890. It consisted of metal and woodwork for boys and cooking, needlework and/or laundry for girls. Metal and woodwork, cooking and sewing were then introduced as core subjects, post 1945 for all high school form 3 and 4 students. In the 1970s and 1980s workshop technology and graphics and design began to emerge, due to the interest of teachers in these areas (Davies, 1998; Jones, 2003; Mawson, 1998). The 1970s also bought about a move to reduce gender differentiation in technology subjects (Jones, 2003; Mawson, 1998).

Technology has evolved from teaching gender specific survival skills to a core subject that includes designing, making and solving problems in real-life situations that involves unique thinking (Davies, 1998). In layman terms technology can be defined as the means that people have sought to provide for their enjoyment and survival (Jones, 2003). When the Technology Curriculum was introduced to New Zealand it was suggested that it was very ambitious compared to the earlier workshop draft

syllabus (Jones, 2003). This could be due to the realisation that technology education involves social, cultural and economic contexts with technical aspects (Compton & Harwood, 2003; Mulberg, 1992).

Due to the consistent changes in the curriculum and content of technology education there is still a lot of confusion as to what the common elements of technological practice are (Mansell, Harold, Hawksworth, & Thrupp, 2001). More recent developments have made the concept of technological literacy easier to define. Being technologically literate involves "using a variety of means to address needs and opportunities and solve practical problems within society" (Ministry of Education, 1995, p.8). Other new developments include the components of practice being used as a base for assessment of technology practice. The components of practice consist of brief design, planning for practice and outcome development and evaluation (Compton & Harwood, 2004). By using these, teachers now have a base to assess the process of technology practice rather than just the outcome or final product. Needless to say with the consistent changes made to technology education in the past years, a lot of the literature focuses on the need for teacher development (Brown, 1999; Jones, 1998; 2003).

The programme that is taught at a large New Zealand university at which the participants of this research attended, is a three year education degree which assumes "intellectual structures and dispositions that enable and facilitate an examination of the understandings, beliefs, attitudes and behaviours that underpin teaching practice" (Grudnoff & Tuck, 2001, p.4). Although there is a practical component, a large part of the programme is concentrated on reflective practice. The technology programme that is provided by the university involves two compulsory papers and one option paper. In the first compulsory paper students develop knowledge, understanding and awareness of technological education. The opportunity to develop knowledge and understandings of relevant documents for technology education (eg. Technology in the New Zealand Curriculum, New Zealand Curriculum Framework, Te Whaariki) is also provided. It is intended that the students develop an understanding of technology as an essential learning area. The second compulsory module extends students current technological knowledge, understanding and capability, in which they will become

capable in planning and delivery of a technology education unit for primary and/or early childhood settings. It is intended that students will gain an understanding of the nature of technological literacy as well as explore their personal practice through the development of a technological outcome. The third (option) paper involves students carrying out an investigation that relates to teaching and learning in technology education. The findings of the investigation carried out are expected to further inform their understanding of technology and the needs of the learners in technology.

**Literature Review**

When a newly educated teacher commences his/her career he/she is faced with the challenge of making a difference in a young persons life (Goodwin & Judd, 2005). Many teachers feel nervous for a variety of reasons before embarking on their first job and the reality shock of teaching affects beginning teachers in a variety of ways (Grudnoff & Tuck, 2001; 2003; 2005; Lang, 2001). Lang (2001) discusses that for much of the first year, beginning teachers' are immersed in a 'survival stage.' Factors that are affected by the 'survival stage' include tiredness, stress on personal and family relations and a lack of balance in their lives. Beginning teachers' also face the stress from high expectations they have placed on themselves and it has been documented that a high proportion of teachers leave in their first five years of teaching (Lang, 2001).

When beginning teachers are also faced with the implementation of a curriculum area that is still under some considerable development, then their induction into their chosen profession is further compromised (Stein et al., 2003). As well coming to grips with the understanding of technology education, beginning teachers are also trying to cope with immersion into school culture, acceptance by students, fellow teachers, administration and parents (Stein et al., 2003). Needless to say there is a lot of published work on ways teachers cope with the stress of becoming a teacher (Goodwin & Judd, 2005; Grudnoff & Tuck, 2001; 2003; 2005; Lang, 2001).

Technology preservice educators also face problems when instructing aspiring teachers to effectively teach technology programmes. McIntyre (1990, cited in Grudnoff & Tuck, 2001. p.2) discusses how initial teacher education must synthesise

the knowledge required for effective teaching, that is, general day to day classroom knowledge and pedagogy relating to curriculum content knowledge. Therefore technology preservice educators are faced with the issue of balancing implementation and practice, and the curriculum (Hansen & Lovedahl, 2004). Literature suggests that revision may be needed of technology education programmes that prepare aspiring teachers (Hansen & Lovedahl, 2004). It is important however for preservice education programmes to focus on the understanding of technological literacy in their students, since it is the aim of the technology curriculum to "enable students to achieve technological literacy through the development of: technological knowledge and understanding; technological capability; understanding and awareness of the relationship between technology and society" (Ministry of Education, 1995, p.8). For beginning teachers to instill this knowledge in their own students they need to have an understanding of what technological literacy is. It is imperative that students come out of their preservice education with this understanding. Another thing to note is that people tend to teach in the way they were taught, so the emphasis in quality teacher education programmes in technology needs to also be on what might look like best practice (Hansen & Lovedahl, 2004) and the recognition of technological literacy.

Research done in the same field includes a study that rates the quality of preparation beginning teacher's had to teach specific curricular areas (Tuck, 2005). In 1999, technology rated very poorly; sixteen percent of the teacher participants found they were very well prepared compared to thirty-two percent who found they were not very prepared at all. However these results improved and in 2004, forty-four percent of the teachers found they were very well prepared compared to six percent who were not very well prepared (Tuck, 2005). This research highlights the difficulties that have been faced across a wide spectrum in regards to implementing technology as an effective curriculum area.

**Methodology**

This research was situated in the interpretative social science paradigm. Interpretative social science allows the researcher to see the world through their participant's eyes (Neuman, 2003). In line with the interpretative social science paradigm the research was approached in a qualitative manner. Qualitative research involves the

understanding of social phenomena from the participants' perspective (Ary, Jacobs, Razavieh, & Sorensen, 2005). It involved gathering data that gives rich, detailed insights into participants' experiences (Hoepfl, 1997).

The research strategy used in this qualitative study was a case study. Case studies "illuminate the general by, looking at the particular" (Denscombe, 2003. p.30). They study things as they naturally occur, instead of manipulating variables. "Rather than using variables and their attributes as categories, and units of analysis by which count or measure the occurrences of the variables, qualitative researchers gather rich description of a phenomenon of interest" (Mutch, 2005, p.43). Therefore there were no dependent or independent variables involved in this study.

The researcher role was that of a peripheral member, in which a distance was maintained between herself and participants (Neuman, 1997). At the time of the research she was currently completing her degree at the university where the participants had previously studied. Therefore, she had had personal experience of the technology courses offered at the university and lecturers comments, good grades and the completion of a specialist technology module provided the researcher with confidence of her understanding of what a quality technology unit should consist of giving further confidence in her interpretations of the findings.

Initially, 11 beginning teachers took part in this study, all of whom were educated at the university. The teachers all taught at schools situated in West Auckland and teach classes from year 1 to year 4. Participants were selected by purposeful convenience sampling. In purposeful sampling researchers intentionally select participants to gain understanding of the central phenomenon (Creswell, 2005). "Purposeful sampling allows for rich information cases which can be studied in-depth" (Patton, 1990, cited in Hoepfl, 1997, p.51). "In convenience sampling the researcher selects participants because they are willing and available to be studied" (Creswell, 2005, p.149).

The teacher participants were approached at two beginning teacher professional development courses over the span of two weeks. The first meeting involved teachers of year one and two children and at the second, teachers of year three and four children were involved. This therefore determined that the sample would consist of

teachers who taught children from year one to year four. The research was explained to the teachers, requesting volunteers to participate and from those willing it was requested that only teachers who had studied at the participating university volunteer. From the meetings 11 teachers volunteered, they were phoned and interview times were arranged. Due to the limited time frame involved for the research, not all teachers were able to be interviewed. From the initial 11 teachers 6 of the teachers participated in face to face interviews and 2 responded by e-mail. Reasons for the three teachers who did not participate include the time constraints of the research and illness.

When interview times were arranged, informed consent obtained. The researcher delivered information about the research in writing to the participating teacher's schools information for both the participating teachers and the school principals. Accompanying this was a consent form for each participating teacher to sign and a permission form for the principal to sign that requested permission for the researcher to interview the teachers on the school site. Informed consent involves accurately informing the participants about procedures, giving them the opportunity to ask questions and have them answered, and be informed that they can withdraw at any time from the research (Snook, 2003). Hoepfl (1997) stresses the importance of providing the participants a straightforward description of the goals of the research. For this reason the researcher ensured she was up front and honest about the intent of the research and the researcher's role. Participants were assured of the confidentiality of their responses and pseudonyms were used to reflect this. "Confidentiality is where the researcher can identify a certain person's response but promises not to make the connections public" (Snook, 2003, p.82). Researchers have a moral obligation to ensure the confidentiality of data (Mutch, 2005; Neuman, 1997).

Semi-structured interviews were used to collect the data. Semi-structured interviews involve open-ended questions that allow for respondents to answer in their own words. They are flexible in the way that there may be key questions to ask but the sequence may be altered or the researcher can probe for more information (Miller & Brewer, 2003). The interviews therefore included open-ended questions that allowed for individual variations. During the interviews the researcher asked questions,

listened, expressed interest and recorded responses (Neuman, 1997). The interviews were recorded and then transcribed. The participants then verified the transcripts, to ensure that the researcher had correctly interpreted their intentions. Mutch (2005) refers to this as 'member checking.' By ensuring that the participants agreed with the researchers interpretations of their interviews, the research has more credibility. The interviews consisted of 2 main questions:

1. Tell me everything you remember about the technology training you received at the University?
2. What were positive and negative aspects of the technology training in terms of how it has impacted your classroom practice?

The e-mail respondents also answered these questions. The data was analysed using thematic analysis. Thematic analysis involves identifying themes within the data (Mutch, 2005).

The research also asked a few closed questions of the participants to further highlight the nature of the sample. These included the participants age group, how many terms they had been teaching for, what programme they studied at the university and the year level they taught.

## Results

| | |
|---|---|
| Age group | 20-30 years (7 teachers) 30-40 years (1 teacher) |
| Terms teaching for | Currently in… 4th term (2 teachers) 3rd term (1 teacher)<br>Had been teaching for… 6 terms (1 teacher) 4 terms (2 teachers) 2 terms (2 teachers) |
| Programme completed at university | BEd - Primary Teaching (6 teachers) BEd – Primary Teaching (Honours) (1 teacher) BEd Early childhood + Upskill to primary teaching (1 teacher) |
| Year level teaching | New Entrants-Year 0 (1 teacher) Year 0+Year 1 (1 teacher) Year 1 (1 teacher) Year 1+Year 2 (2 teachers) Year 3 (1 teacher) Year 3+Year 4 (1 teacher) Year 4 (1 teacher) |

**Table A: Nature of participants.**

Table A shows the nature of the sample of teachers that participated in the research. It shows the age groups of the participants with seven teachers being aged between 20-30 years old and the other teacher being between 30-40 years old. The participating teachers had been teaching for between two and seven terms. The exact amount of terms the teachers have taught is ambiguous. The research was done part way through

a term, which has meant that the answers can be interpreted in two ways. For example the teacher who had taught for six terms could be on their sixth or seventh term. Seven teachers had completed the Bachelor of Education primary teaching programme at the university. One had also continued study to complete the honours programme. The other teacher had completed the Bachelor of Education early childhood programme hence the technology course taken varied from the others being a one-year course to 'upskill' for primary teaching. The participating teachers taught the range of year levels from new entrants to year four.

**What the beginning teachers remembered about their technology courses**

From the technology training received the teachers recalled course content and assessment tasks, they also showed an emotional reaction to both the courses they undertook and the lecturers who taught them and they described what they perceived technology to be. Please note that pseudonyms are used for the teachers.

Aspects of the course content and assessment tasks were recalled by 6 of the teachers.

> Michelle: getting familiar with the curriculum and finding out what all the different areas were. …watching a video and applying it to the curriculum to see what types of things they had done. … making something, so going through the technology process myself and keeping a journal.
>
> Robyn: Making something
>
> Catherine: We had to choose a topic of interest, a technology area of interest… and do a research paper based around it. …make something then relate that to the school curriculum and how you would incorporate it as a unit.
>
> Toni: Had to plan something… my group planned a wedding. … I can remember doing lots of technological type things. I remember we used and looked at different equipment and we made molds for chocolate and looked at packaging.
>
> Stacey: Learning about the curriculum. …watch this video and do an assignment about it. .. sampled different areas of tech …ie food tech and did some practical classes around that.

Kylie: Hands on activities. Assignments related to unpacking the curriculum and identifying how different parts of the curriculum can fit into planning for children's learning.

Emotional reactions of the courses were shown as enjoyment by half of the teachers. Only 1 teacher expressed non-enjoyment regarding the courses offered.

Robyn: I remember having a good time.

Catherine: It was really cool…it was awesome.

Shana: I thought it was really good… I liked how we did a project. That was really cool.

Stacey: I loved tech…year 3 was absolutely fantastic.

Stacey: Learning about the curriculum was boring.

Comments about lecturers were received from four of the teachers. These were all positive comments.

Catherine: I liked the tutor and that made a difference.

Shana: Lecturers were good, I really liked the lecturers.

Stacey: Our lecturer [name of lecturer] was fantastic.

Kylie: Lecturers were approachable and supportive.

Four of the teachers recalled what they had learnt from the courses, describing what they perceived technology education to be.

Shana: I can relate that the children are going through the processes…designing looking if it's good or not rethink.

Morgan: Technology in school needs a purpose. A purpose is needed and your whole unit is based on that purpose.

Stacey: Tech wasn't about teaching kids to make things but the process of making things. ie: the needs wants, planning, problems, solutions, modifications etc.

Kylie: That you have to follow the technology process from start to end rather than picking and choosing aspects like you can with other curriculum documents.

**Positive aspects recalled from the technology training**

Further insights into the teachers understanding of what technology education looks like was also demonstrated in the positive comments they recalled of the technology training provided.

> Michelle: The positive aspects were becoming very familiar with the process myself.
>
> Catherine: Its very child based… it's children's ideas. The journey is as valuable as the outcome.
>
> Stacey: the final product is largely unimportant…it's the getting to it.
>
> Kylie: The importance of following through with an idea in the classroom (across all areas).

Other positive aspects recalled from the training were related to the practical tasks and teaching approaches that were experienced.

> Kylie: Hands on experiences made learning fun and interactive. Variety of teaching approaches and assignments… allowed us to understand how our students feel and the type of conflicts they may face.

One teacher expressed the understanding she received from the technology courses has helped in the delivery of technology units. Highlighting her knowledge of how she assesses technology units.

> Stacey: I have implemented it to the best of my knowledge into my programme. I can easily assess the kids… I look to see if the kids can communicate their ideas, make plans, discuss problems that did occur, make adaptations. … Tech has been a fab way for me to learn how my kids work cooperatively and assess their communication skills.

Also other positive aspects expressed were related to understandings gained in regards to using the curriculum document.

> Robyn: Curriculum wise, I can definitely work my way around it. I found that really useful especially popping into the curriculum with the technology team.

**Negative aspects of the technology unit received**

The teachers found negative aspects relating to the impact their technology training had on their practice to include the difficulties in the realities of teaching a technology unit as they believed it should be.

> Michelle: Practicality and realities of putting a unit in practice. Michelle had taught a toy unit. …found it very difficult with the management of children at different stages and making different products.
>
> Robyn: It's not structured, so you could end up with 21 kids doing different things at different times.
>
> Catherine: One of the things I find most challenging is the time factor. Fitting everything in… it can be very time consuming.
>
> Stacey: The time to organise the practical things, the mess, the cleaning up, monitoring groups… with no help in the class it can be exhausting.
>
> Kylie: Fitting it into real, classroom life.

They also expressed the problematic nature in the difference in their understanding of technology education compared to that of experienced teachers and schools in general.

> Michelle: I have found that experienced teachers don't have the same understanding.
>
> Robyn: It is possible that the understanding may be different with experienced teachers.
>
> Morgan: Describing a unit this teacher taught. I was just handed the unit. I found it really difficult because there was no need provided. There was no purpose to this unit. I think technology is a very new things for a lot of teacher's as well, and they don't realise that part of it is the need process.
>
> Kylie: I think there is a lot of misunderstanding surrounding the technology curriculum within schools.

The teachers also reflected that many technology units are more in line with arts and crafts rather than technology education.

> Catherine: There's quite a fine line in a lot of cases, between arts and crafts technology

Morgan: Describing a unit this teacher taught. It was to design puppets and to me it fitted into the arts and crafts. My whole mindset for this unit was that we were doing crafts.

Kylie: I think it is covered superficially.

**Discussion**

It was evident from the results that the teacher participants demonstrated a relatively sound knowledge of what technology education entails. This was also reflected by the improvements in the results posed in Tuck's (2005) research that rated the quality of preparation beginning teachers received to teach specific curriculum areas. Grudnoff and Tuck (2001) also reflect this in regards to positive comments made by tutor teachers, in their research. Four months into beginning teachers' teaching practice, "strengths in particular curricula were identified… and to a lesser extent the quality of knowledge and understanding of curriculum documents in general" (p.8).

The results showed the teachers found the practical aspects of the training provided to be positive aspects of their technology training. Stables (1997) states "An approach that breeds both confidence and skill in supporting children's making, is one that provides teachers with opportunities for hands-on practical work themselves" (p.63). By not solely focusing on developing the skills required, the activity also provides knowledge to inform planning (Stables, 1997). Lang's (2001) findings also suggested the need for more practical experience overall in preservice education as this would be more helpful in coping with the 'survival stage' of teaching. By providing the teachers with practical tasks during their preservice technology training. They were better able to transform their knowledge gained from doing the tasks into their classroom practice.

Although the teachers gained knowledge of what technology units entailed the ability to put this in practice was impaired by influencing factors such as schools and experienced teachers' lack of understanding regarding technological education also became apparent from the results. The need for professional development for teachers who have been in the service for years is required. This however is not a new discovery. Tuck's (2005) results describe the school's view of technology as different

to that of the beginning teacher reinforcing the need for professional development. Stables (1997, p.60) also states "very few primary teachers have received formal training in the teaching of technology education." Therefore it is evident that professional development needs to be ongoing, and teachers understanding of technological knowledge and content knowledge needs to be better in order to effectively implement technological activities in classroom practice (Jones, 2003). Beginning teachers are therefore faced with the challenge of how they can use their knowledge, to influence a change in experienced teachers' understandings.

Other issues which impaired beginning teachers from effectively teaching technology units was related to the management of implementing a technology unit, this could be connected with their lack of classroom knowledge (Grudnoff & Tuck, 2001, 2003). It needs to be realised that preservice education providers do not provide the knowledge for beginning teachers to overcome the general day to day running of the classroom (Grudnoff & Tuck, 2003). High expectations which beginning teachers also have on themselves also add to the stress of the first six months of their career (Lang, 2001) further impacting on their ability to implement effective units. It is expected that with more practical experience, implementing technology units will become easier.

Another factor that came from the results which is interesting was the importance of teacher-student relationships. Research on effective teaching has found that positive relationships between teachers and their students is a vital factor in creating learners (Carpenter, McMurphy-Pilkington, & Sutherland, 2004; Delpit, 1997; Hawk, Tumama Cowley, Hill, & Sutherland, 2002; Scheurich, 1998). Building relationships requires teachers' to have caring, respect, passion, patience and perseverance. They need to go the extra mile (Hawk et al., 2002). With the lecturers of the technology programme providing positive relationships with their students, they are modelling best practice.

**Implications**

The study showed the need for experienced teachers to be exposed to more professional development in this area. This will help the continuity of understanding in regards to what makes technology an effective learning experience more school

wide. Due to the continuous changing understandings and developments in technology education, preservice education programmes need to constantly be evaluated in order to keep teachers' up to date with these changes.

**Limitations of the research**

There are limitations in the research regarding the credibility of this study. These are due to the limited time frame to collect and analyse data and the limited size of the sample. Also if the research contained tutor teachers views, then triangulation of the results would have provided richer more comparative data. However by getting interview transcripts verified, some credibility has been maintained. Another problem with the research was realised once the questions were answered. It would have been beneficial if the researcher was able to test the questions on a sample similar to those that participated, such as a pilot test. It is not recommended that the findings of this research, although interesting, be used to generalise for all beginning teachers. A more comprehensive study would be required to give more reliable results.

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