The importance of Reflective Journaling as a research tool used to analyse the professional identity of pre service Technology Teachers

Deborah Trevallion   The University of Newcastle

Abstract:

The advancement of a tertiary student's professional identity as a technology teacher is essential to grasping Technology education concepts and framing future Technology education research.

The aim of this research is to examine the professional identity transition that occurs for students' over the course of a technology teacher education pre-service program and to determine the factors that contribute to a successful transition. It will examine the student's initial identity as a trade worker, trace their identity, knowledge, skill, values and attitudes developed during their first course in a Technology Teacher pre service university program. This study is a part of a larger study. This study uses online journaling during their first technology foundation course, as a way to examine the professional identity change of Technology students moving from a technical/trade worker to a Technology teacher. The journaling is time-lined against specific pedagogies in order to gain insight into the impact on the Technology teachers developing professional identity. Analysis is carried out using the Most Significant Change technique (MSC) (Davies & Dart, 2005). MSC is a technique for monitoring and evaluating change. This study suggests that a student's tertiary education should be focused on them developing their identity as a professional Technology teacher. A technology teacher's understanding of the nature of technology heavily influences their professional identity, their perceptions of technology education and consequently shapes their teaching practice. The influences on the development of this identity, both positively and negatively, will direct pedagogues used in their teaching preparation and will also direct future research in Technology education.

Keywords: On line journaling, Reflective journaling, Most Significant Change, Professional identity, Technology Teachers, Technology Education

Introduction

The benefits to researchers, in examining reflective journals, lies in the use of the narrative in understanding professional activity. (Thomas, 1995a). It is commonly acknowledged that human beings live storied lives, personal narratives, and that those stories are an important source of insight into professional practice (Carter and Doyle, 1996; Connelly and Clandinin, 1990). Thus, narratives such as research journals constructed by pre service teachers in the course of their work can provide researchers with insight into narratives not available from any other source. Reflective journaling is a common practice among qualitative researchers to maintain an ongoing reflective account of their negotiation of various subject positions, construction of knowledge, process through which knowledge is constructed, emotional reactions to the process of data collection, and any other information that the researcher deems relevant to understanding the processes of making sense of data. Reflective journaling is a direct reflection of your epistemology and how you want to document your data.

This study, forms part of a thesis that uses a quantitative, mixed-method approach involving case study together with an analysis technique called Most Significant Change (MSC) (Davies & Dart, 2005).

Rationale

The benefits to researchers in examining reflective research journals lies in the use of the narrative in understanding professional activity. (Thomas, 1995a). Teachers' stories have been described as an untapped source of information about teaching and an opportunity for teachers to communicate about their work to others. (Florio-Ruane, 1991). Thus, narratives such as research journals constructed by pre service teachers in the course of their work can provide researchers with insight into narratives not available from any other source.

The researcher will benefit from a retrospective analysis of the database the journal provides. The benefits show that it will:

- Serve as a reminder of the ideas and events which guided subsequent action. It will provide a database from which precise information can be retrieved.
- Provide a record of plans and achievements which facilitated evaluation. The journal will document both plans and actual achievements throughout the research process. This written record facilitates the evaluating of progress and, in the case of lack of progress, of reviewing possible reasons for it.
- Supply an account of events and procedures which will allow a detailed write up of the study.
- Allow a recall and reproduction of the thinking behind key decisions in my work. The detailed record of experiences captured in the research journal is a powerful form of data which demonstrates the changing professional identity of the Technology teachers.
- Comprise an instructive narrative of the students' professional growth showing a detailed account of the changing identity throughout the course.

- Provided physical evidence of progress that will provide students with a sense of achievement. Baxter, Hughes and Tight (1996: 49) write that as the research journal grows, 'it will serve as a physical reminder of just how far you have progressed'.
- Provide an account of experiences and ideas which, when revisited, may in turn provide the springboard for further ideas.

Professional identity

It is strongly argued by Fullan (1992) that change is a process rather than an event, and that curriculum changes are rarely implemented as originally intended but rather undergo a process of common change. This infers that related experiences in the teacher's life, their own schooling, family, cultural values and beliefs, their previous industry and workplace understandings and their experiences during their teacher training program will impact on the technology teacher's professional identity.

University coursework plays an important role in "reframing prior conceptions of self as teacher and in re-defining new teachers professional identity by making choices and decisions that actively locate them in a particular context" (Coldron & Smith, 1999:714)

Mature age pre-service teachers draw on their life experiences (such as technical and trade backgrounds) to inform their professional identity (Bussey, Dormody & Leeuwen, 2000). Many pre-service teachers also bring with them a strong memory of how they were taught (Groundwater-Smith et al., 2007). MacGregor's (2013) research found that this does not impair nor hinder their ability to take on board new ideas and concepts. There has been considerable research into the forms of knowledge that teachers, including beginning Technology teachers (Leach & Banks, 1996; Moon & Banks, 1996; Banks & Barlex, 2000) require to perform their role.

Banks and Barlex, (2007) argue that pre-service technology teachers need to develop their own personal subject construct, which they suggest is, 'A complex amalgam of past knowledge, experiences of learning, a personal view of what constitutes 'good' teaching and a belief in the purposes of the subject and an understanding of students as learners'.This view enables the teacher's role to move beyond that of transmitter of knowledge (Beijaard et al., 2000; Staples 2003) to one of facilitator of learning.

Pre-service technology teachers in this study therefore could be identified as the 'new generation' of technology educators. (MacGregor 2013) That is, through their recent university studies, they have been introduced to and supported in developing a holistic understanding of design and technology education that moves away from the more traditional notions of skilling currently implemented in many Australian secondary schools.

The question then remains: How can technology teacher assist pre-service Technology teachers to shape their professional identity to include current and future curriculum and pedagogical change?

Making Meaning

It is explained by (Coldron 1999) that teachers acquire their identities using four social traditions. These include: teaching practice, teaching personal actions and interactions, teaching using best practice and quality teaching and teaching morals. He argues that in order to support student identity change it is important to ensure that the pedagogy used assists students in meaning making.

In support of this, Forret et al, (2013) argue that a technology teacher's understanding of the nature of technology heavily influences their perceptions of technology education and consequently shapes their teaching practice. It is firmly understood that in order for teachers to teach technology effectively it is necessary for them to have a well-developed understanding of technology (De Vries, 2012, Forret et al, 2011).

Forret et al,(2013) maintain that the most significant change occurred in the broadening of students' views of technology education to more strongly consider other aspects such as; problem solving, creativity, design and sharing ideas, considering the environmental impacts, planning and manufacturing, examining and testing resources and materials. Here, their perceptions of technology and technology education were strongly intertwined and a change in their view of technology was accompanied by a change in their view of technology education. The findings of this study, build further upon these findings.

Coldron, 1999, further finds that the pedagogy must use a multimodal approach as they are crucial elements of meaning making. These findings support the view argued by Stevenson (2004:125) that "Innovative thinking can be equated to problem solving and problem solving is equated to meaning making". The focus of the pre-service technology teachers' identity needs to shift from a process of construction to the process of construction of meaning and the interrelationships of differently constructed meanings (Jonassen, D. et al 2002).
Pre-service teacher education develops perceptions and identity to align it with the Technology Education curriculum. It shapes ideas and concepts and practices that students bring into the program.

Curriculum areas such as Technology Education include food technology, industrial design, computer technology, textiles and design, engineering studies and design and technology is dealing with curriculum change that provides conceivable misunderstandings concerning curriculum focus and execution. (Harwood and Compton (2007).

Traditionally the curriculum and approaches included lockstep manufacturing, scientific testing, application of scientific formulas and material manipulation. The current Australian view of Technology Education frames learning holistically using technological experiences, technological understandings and the character of technology as the main fundamentals. In the Ministry of Education research report, Compton and Compton (2010) identified a number of

misunderstandings including: manufacturing as the main focus of the curriculum, making craft projects and ignoring problem based learning with life-long skills as just a few. They strongly argue that the holistic approach challenges the existing professional identities of many pre-service and current teachers, so this holistic approach is placed into the "too hard" basket and often ignored by teachers in the classroom.

The associated challenge, for technology education teachers, is one which will promote this holistic emphasis on alternate constructions of meaning and their interrelationships.

Reflective Coursework
In light of this convincing evidence an introductory course was developed to include content on: the philosophy and rationale of Technology Education, curriculum theory and design, central concepts, modes of inquiry, content structures, technology teaching- plan, teach and assess as well as a range of authentic learning activities.

Reflective processes have a particularly important role to play here as students will be required to utilize: articulating and rationalizing, acknowledging, expressing and examining feelings, describing events and procedures, establishing goals, formulating plans, and deciding on actions, describing and evaluating progress (or lack of it), clarifying concepts and their implications for the research, capturing, exploring and pursuing ideas and structuring thoughts.
The reflective journaling involved the students answering the following questions:

Week 2
Here, the students responded to a mandatory question:
- What is Technology Education?
- Consider what you have observed and learned in class and its impact upon your learning. Evaluate the usefulness of this in secondary technology education classrooms.

Week 4
The students again responded to mandatory questions:
- Explain what is meant by teaching design in a secondary technology classroom?
- Evaluate how using the design process as a tool to solve problems contributes to life long learning.
- What is Technology Education?

Week 6
The students again responded to mandatory questions:
- Explain how using the design process as a tool to solve problems contributes to life long learning.
- Should teaching "manufacturing" or "design" be the major focus in technology mandatory classrooms. Justify your response.
- What is Technology Education?

Week 10

The students again responded to mandatory questions:

- Explain how using the design process as a tool to solve problems contributes to life long learning.
- How could you use a design process to promote higher order thinking in a secondary technology classroom?
- What is Technology Education?

Week 12

The students again responded to mandatory questions:

- Elucidate how life long learning can evolve from the technology classroom.
- Describe how using the design process as a tool to solve problems contributes to life long learning .
- What is Technology Education?

Most Significant Change Technique

The Most Significant Change (MSC) (Davies & Dart, 2005) is a technique used to monitor and evaluate social change programs like the one in this study that examines the change in professional identity that pre service teachers experience in their first course at university.

This process involves the collection of significant change (SC) stories emanating from the students, during their online journaling and the systematic selection of the most significant of these stories. The researcher is initially involved in 'searching' the course for impact. Once changes have been captured, the researchers will read the stories and have in-depth discussions with the selectors about the value of these reported changes.

The MSC contributes to the course evaluation because it provides data that demonstrates the impact of the course on pre service technology teacher's professional identities.

Significant change narratives, once collected, were analysed and filtered up through the levels of authority, which narrowed the number by examining them for the most significant changes before referring them to the researcher who narrowed them further. The number of stories is whittled down through a systematic and transparent process.

As stories are selected, the criteria used to select them are recorded, so that each subsequent round of story selection is informed by feedback from previous rounds. The researcher is effectively recording and adjusting the direction of its attention and the criteria it uses for valuing the change.

As this process progresses, a document is produced with the stories selected at the highest organisational level, in each domain of change. The stories are accompanied by the reasons the stories were selected.

This documentation allows the researcher the chance to identify the significant changes whilst concurrently recognising the reasons why the changes were made.

Research Findings

Four partial extracts from a student's answer to the question, "What is Technology Education?" are presented here. This illustrates the change in thinking as he progressed through the course.

Week 2

"I believe that Technology Education is about teaching kids to make quality products. I have had apprentice carpenters and it is just like having a bunch of younger apprentices. I get to share my skills, my expertise and industry knowledge with the children and they get to enjoy making a job"

Week 4

"Technology education is about designing and making quality products. Design is not decoration it is coming up with new ideas and making them. To get the kids interested they should be allowed to make different things but I don't see how I can help 20 kids in the same class make 20 different things. I just don't think that it will work……

If 20 kids are making 20 different things how can I make sure that they all make something that they are proud to take home?......

We have got so much to teach: safety, materials, tools, design, quality skills and techniques when making the product. I just can't see how I will have the time to fit in all the other stuff-design, research, sketching and evaluating. It sounds like paperwork, red tape and for no reason, I will run out of time….

Week 10

The technology day was so important! I learned so much. I didn't realise how much organisation it took to be a teacher. The students were great and we had so much fun. Their creativity absolutely floored me, they came up with solutions that I would never have thought of and they loved what they were doing….

I understand now why it is so important to give them a problem, it means that they can relate to what they are doing. It gives them a reason to do it. They loved researching the problem as we found new technology and materials that they could use, we also got to laugh together, building our rapport by viewing some silly ideas for solutions on the net….

I was surprised that I had plenty of time to teach every section of the design process and that even though everyone manufactured a different solution, they knew what they were doing and I didn't have to show every student, ever thing they had to do….

In another part of the day I watched my teaching partner gets his students to make models of bridges for no apparent reason, the students enjoyed the making but were then bored and restless and really pushed his classroom management skills. They all made a nice model of a bridge but finished early and became destructive as they destroyed them by tearing and even burning them. If he had taught each stage of the design process they students

would have been so much more focused as they would see the relevance and understand so much more about creating new solutions not the same old stuff.

So, What is Technology Education? I learnt that when I worked in the school with real 12 year old students that Technology Education is about using a process to solve problems. The design process can be used to solve problems using any materials. It is the connection between food, textiles, timber, graphics, metal, engineering and all technology subjects….

They need to use the design process so it can help them to solve problems at home….

Students need a problem to solve to make what I am teaching relevant to their own lives…..

They need to sketch to get their first ideas on paper where they can be evaluated and improved. Students are involved in secondary research to examine existing ideas from the past and the present and new ideas that they could incorporate into their solution….

Primary researched is used to teach a range of technical skills so that the students will not have to ask the teacher how to do everything. Primary research can also be used to build and test models of possible solutions so the best final product can be made….

It is important that they set up a plan of what to do. They need to complete a production drawing with all measurements included as their design solution and produce a written step by step procedure reminding them how to make the product….

Their manufacturing must be of superior quality. Because the teaching is not instructing the students on how to complete technical skills, they have the time to focus on quality….

Evaluation is important and it can be so easy. Students can use Edward De Bono's (PMI) Plus , minus and Interesting but change the I to Deborah Trevallion's "I" for improvements and ask If I were to make this again, what would I improve on….

Week 12

"I have learnt that Technology Education is about design as well as manufacturing and design is not just decoration, It is innovation, coming up with a new idea and following it through….

Technology Education is about teaching children the skills they need to think. They need to be able to think critically in order to solve problems in this ever changing world.

As problems are constantly changing they need to be able to use a process (the design process) and apply it to any situation. They must be able to understand the problem, research it, new and existing ideas as well as new and sustainable materials, skills and techniques and computer technology allows them to have the latest information at their fingertips. …..

We must teach them to sketch so they can visually communicate their ideas. They need to test and experiment and

practice new skills in order to build a quality solution to the product. Most importantly technology education involves constant evaluation. The students must evaluate every step of the process to check that they are on the right path, this may mean that sometimes the students will have to change something before they progress in their manufacturing……

So I think that Technology Education is about teaching the children to solve problems using the design process in order to come up with an innovative and sustainable solution that can be manufactured by them, into a high quality product."

The journal documentation above is a sample of typical documentation from 57 out of 69 students. This indicated that 82% of the students in this first semester university course undertook significant change in their understanding of Technology Education and professional teaching identities.

Discussion

The benefit of the journaling experience was evident in the manner in which it allowed undeveloped thoughts to be transformed for further analysis and development. All four extracts show how journal writing can be an effective means of pursuing thoughts, discovering insights, and making decisions. The contribution the research journal can enable researchers to reflect more effectively on their work and to experience the benefits of reflection.

In this instance, there is a major change in the student's understanding of What is Technology Education? This in turn can be seen in the change in his approach to teaching Technology Education and the greater change in his professional identity as a technology teacher.

The evidence of this can be seen in his developing understanding of exactly what Technology education entails. There are obvious developments in the language that he uses, his focus moving from making to problem solving and his determined approach to teaching design as a problem solving using authentic problems in order to create relevance for all students.

The evidence of changes in his language are apparent, as he progresses throughout the course, the terminology used changes from a laisse fare approach to a more formalised approach. In the first few weeks he documented in his online journal, using terms like "Kids, Jobs" and "making" toward the end of the course he referred to "children" and "students" and discussed the "manufacturing of innovative and sustainable solutions." This evidence, demonstrating change, in his use of language is indicative of his developing professional teacher identity as he moves from a trade based worker to university student who is determining the type of technology teacher that he will become.

The vital modification to his teaching involved moving the emphasis from "making" using a master and apprentice approach to a "problem solving" approach. He advocated the use of the

design process and admonished the traditional approach of using making the centre of the classroom. This is evidenced where he commented on the approach used by his peer/colleague and the teaching approach that they used on the technology day. He found that the lesson fell short because the students, involved only in manufacturing, could find no link between the lesson and the world in which they lived. Therefore the schoolwork was deemed unimportant as it was irrelevant to their lives. The offshoot of which, resulted in classroom management issues, boredom, destructive behaviour and devaluing of the subject by his students'. The analysis and critical thinking demonstrated in the journal by the pre service technology teacher confirms the progression of this teacher's professional identity.

His determined approach to teaching design as a problem solving using authentic problems is proof that he has developed a greater understanding of the importance of Technology Education and has made this part of his entity. He explains in detail why each step of the design process is important. He includes the importance of setting authentic problems for the children to solve and how the authenticity must create relevance in the students' lives. He includes the processes of ideation, primary and secondary research, production sketches and written manufacturing procedures, manufacturing and the importance of ongoing evaluation throughout the process. He espouses an understanding that design is not decoration but involves innovation and sustainability. This journaling demonstrates that he values the passing to his student's deep knowledge and deep understanding that is relevant to the children's lives.

Conclusion

The teachers' stories of their experience, communicated through journals provide insight into what being a technology teacher means. This is instructive for other teachers, teacher educators, and researchers. Carter and Doyle (1996) explain that this biographical perspective in the study of teaching acknowledges and is a reflection of the central role of the personal in understanding human action. From this standpoint, Thomas (1995b) argues that much of value to the educational community can be learned by conversing with, and listening attentively to, what teachers have to say about their classroom practices, their experiences of schools and of the formal and informal relationships within them, their insights into pupils as learners, and the corpus of professional understandings and craft knowledge that derives from experience.

Given the acknowledged power which narrative has for communicating and providing access to human experience and knowing that listening is important, the reflective journal would clearly seem to have the potential to provide insight into what technology teaching means and what being a technology teaching researcher involves.

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