

Using Online Journaling and Most Significant Change Technique to Examine the Professional Identity Development of Pre-service Technology Teachers.

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Abstract

If a preservice technology teacher is to advance to teach technology subjects using a holistic approach, then the advancement of their professional identity as a technology teacher is reliant upon the grasping of essential technology education concepts.

The aim of this research is to examine the professional identity transition that occurs for students' during a technology teacher secondary education pre-service program and to determine the factors that contribute to a successful transition which in turn leads to a solid understanding of technology education.

The methodology discussed here is part of a larger study. This paper examines the student's initial identity as a trade worker; it traces their identity, knowledge, skill, values and attitudes developed during their first technology foundation course in a secondary technology teacher pre-service university program.

It uses online reflective journaling during their first course, as a way to trace 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 analyse the pedagogue's impact on the technology teacher's 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.

The results show the developing professional teacher identity will be impacted upon through the use of specific pedagogues early in the teacher education program. The students' made the greatest changes to their teaching practice and professional identities after achieving success in authentic, experiential hands on learning situations.

The paper discusses significant changes in the students' professional identity and this has significant implication for the training of secondary teachers that can be expanded upon in future research.

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

Rationale

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.

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). Recording these in reflective journals provides a database of precise information including a record of plans and achievements and an account of events and procedures, experiences that demonstrates the changing professional identity of the technology teachers. The journal provides physical evidence of progress and an account which, when revisited, may be a springboard for further ideas.

This study, forms part of a larger research project that examines the development of the professional identity of pre service technology teachers. It uses a quantitative, mixed-method approach involving case study together with an analysis technique called Most Significant Change (MSC) (Davies & Dart, 2005).

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)

Many pre-service teachers draw on their life experiences to inform their professional identity (Bussey, Dormody & Leeuwen, 2000) and 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.

Forret et al, (2013), further found 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).

Pre-service technology teachers in this study, through their recent university studies, 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 secondary schools (Compton & Compton, 2010)

Pre-service technology teacher education must challenge students to develop a deep understanding of holistic design thinking incorporating, value based and sustainable design. The students need to align their identity with these concepts as it will shape their identity and their future teaching practice.

Methodology and Analysis

In light of this convincing evidence a foundation course presented to students in their first semester of university was developed. This course used a range of authentic learning activities and students were required to use metacognition to reflect upon their coursework and use an online journal to answer the question, “What is technology education?” Journaling occurred in weeks 2,4,6,10 and 12 of the course.

The Most Significant Change technique (MSC) (Davies & Dart, 2005) was used in this study to monitor and evaluate change. This process involves the collection of significant change stories emanating from the students, during their online journaling.

The use of the MSC technique is very useful in this instance because:

- It provides a tool to support an objective identification of change.
- It clearly identifies the values that prevail and it stimulates a discussion about which of those values are the most important.
- It is a hands-on form of analysis.
- It encourages synthesis during data collection because people have to justify their decisions.
- It delivers a rich picture.
- In this context, conventional monitoring and evaluation tools cannot provide sufficient data to make sense of program impacts and foster learning.
- MSC is suited to monitoring that focuses on learning rather than just accountability.

The ten MSC implementation steps (Davies & Dart, 2005) were implemented in this study as follow:

1. Raising interest: Information pertaining to why this study is important, how it will be carried out and how it will be analysed was introduced to the students during the orientation session. This included an explanation about the process of reflective online journaling, about evaluating pedagogues used in tutorials at specific intervals and a description of the MSC technique. This information was clarified for all students
2. Define the domains of change: This involved the identification of broad domains including:
 - Changes in a pre-service technology teacher's professional identity;
 - Changes in understandings about technology education; and
 - Changes in the approaches used to teach technology education in secondary schools.
3. Defining the reporting period: The changes were recorded over the duration of semester one foundation course that was specifically developed for this study.
4. Collecting Significant Change stories: Significant change stories are collected from the students who were directly involved in the coursework. In examining the stories, the research assistants allocate their stories to a domain category:
 - Changes in a pre-service technology teacher's professional identity,
 - Changes in understandings about technology education and
 - Changes in the approaches used to teach technology education in secondary schools.
5. Selecting the most significant of the stories: The stories are analysed, filtered through the levels of authority - 20 postgraduate students, 4 tutors, 2 research assistants and the chief researcher, where they analyse the stories and examine them for the most significant changes.
6. This process involves each level of the hierarchy reviewing a series of stories sent to them by the level below. They each select the single most significant account of change within each of the domains and passes the selected story up to the next level of the program hierarchy, and the number of stories is whittled down through a systematic and transparent process.
7. Feeding back the results of the selection process: Every time stories are selected, the criteria used to select them are recorded, so that each selection is informed by feedback from previous rounds. A document was then produced with all stories selected at the highest organisational level over that period in each domain of change. The stories are accompanied by the reasons they were selected.
8. Verification: The selected stories can then be verified by visiting the students' online course journals where the described events are accurately and honestly stored.
9. Quantification: It is possible to include quantitative information as well as qualitative information. The qualitative data is an examination of the stories through the levels of authority. The extent to which the most significant change is identified in one case place will be coded and quantified at each interval and overall from week two to week twelve.
10. Secondary analysis and meta-monitoring: After quantification, there is a need to analyse the monitoring system itself. Analysis occurred by identifying who participated and evaluating how they affected the contents, the type and frequency of change reported.
11. Revising the system: The final step in the MSC data analysis process is to use the most significant change results to revise the design of the course.

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 jobs. I have had apprentices and it is just like that..... I get to share my skills, my expertise and industry knowledge with the children and they get to enjoy making a good 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. Kids 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..... How can they all make something that they are proud to take home?....."

There is 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 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 we got to laugh togetherby viewing some silly ideas for solutions ...

I had plenty of time every one manufactured a different solution..... I didn't have to show every student, ever thing they had to do....

I watched my teaching partner gets his students to make models for no reason, the students enjoyed the making but ...really pushed his classroom management skills. They finished early and became destructive If he had taught the design process they students would have been more focused as they would see the relevance and understand more about creating new solutions ...

So, What is Technology Education?It 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, all technology subjects....

The design process will them to solve problems at home....

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

They need to sketch ... and improve. Students are involved in secondary research to examine existing ideas ... that they could incorporate into their solution....

Primary researched is needed to teach a range of technical skills to be used in manufacturing and to build and test models of possible solutions so the best final product can be made....

It is important to plan of what to do. They need to complete a production drawing ... 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

Technology Education is about teaching children the skills they need to think critically in order to solve problems...

As problems are constantly changing they need to be able to use 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 sketchthey need to test and experiment and practice new skills ...technology education involves constant evaluation. The students must evaluate every step of the process, this may mean that sometimes the students will have to change something before they progress in their manufacturing.....

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.

Discussion

The benefit of the journaling experience was evident in that it allowed undeveloped thoughts to be transformed for further analysis and development. In this instance, there is a major change in the student’s understanding of “What is Technology Education?”

The evidence of this can be seen in his developing understanding of exactly what Technology education entails. There are three main changes to be seen in the journals; the language used changes, the focus moves from making to problem solving and there is a determined approach to teach design as problem solving using authentic problems in order to create relevance for all students.

The evidence of changes in language use is apparent. As he progresses throughout the course, the terminology used changes from a laissez-faire approach to a more formalised approach. He began using terms like “Kids, Jobs” and “making” but toward the end of the course he referred to “children” and “students” and discussed the “manufacturing of innovative and sustainable solutions.” This evidence, 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” to a “problem solving” approach. He advocated the use of a design process and admonished the traditional approach of making being the focus of the classroom. 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 problem solving using authentic problems is proof that he has changed his view on how to teach technology education in schools and this demonstrates that he places greater value in using a holistic approach, which is a part of his identity. He explains in detail why each step of the design process is important, including setting authentic problems and explaining that the authenticity must create relevance in the students’ lives. This journaling demonstrates that he values his student’s developing deep knowledge and deep understanding that is relevant to their lives.

Conclusion

The teachers' stories of their experience, communicated through journals, provide insight into the journey of becoming a technology teacher. 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 (1995) 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 potential to provide insight into what technology teaching means and what being a technology teaching researcher involves.

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