



The Changing Professional Identity of Pre-service Technology Education Students.

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If a preservice technology teacher to teach technology education using a holistic approach, then the advancement of their professional identity as a technology teacher will be reliant upon the grasping of essential technology education concepts. This is a part of a larger study, which examines the transition of a pre service Technology Education teacher during their pre service program. It records their journey from their initial identity as a trade worker; tracing their identity, knowledge, skill, values and attitudes development during their first encounter in a school as a pre-service secondary Technology teacher. This study demonstrates how the developing professional teacher identity is impacted within the Technology Foundation Course and identifies the factors causing the greatest change. The focal lens is on the coursework and the authentic activity, including the Technology Day which leads to a solid understanding of Technology Education. It uses personal folio's, online reflective journaling and interviews as a way to trace the professional identity change and the results are presented using the Logic Framework Model.

This paper discusses significant changes in the students' professional identity and this has significant implication for the training of secondary teachers.

Keywords: Authentic Learning, Reflective journaling, Concept mapping, Logic Framework Model, Professional identity, Technology Teachers, Technology Education



Introduction

This study investigates the factors that shape the professional identity of preservice Technology Education (TE) students who are transitioning from trade and technical workplaces to university in order to become secondary TE teachers. During the period that this research was undertaken, TE underwent major curriculum changes and this succession of curriculum change generated high levels of tension and confusion in TE (Seemann, 2003), resulting in a change in identity for secondary TE teachers (Harfield, 2014; Williams, 2012) and a resistance to further TE curriculum changes (Howard & Mozejko, 2015). As such, the challenges associated with professional identity development must be addressed to enable the effective transition of a preservice TE student to a TE teacher. This study focuses on the professional identity changes required to support the modifications to the TE curriculum and seeks to identify a way to promote professional identity transition.

This study utilises six case studies. The data was collected during the first semester of preservice teachers study in a TE Foundation course, through entry folios that were compiled to gain entry into the Initial Teacher Education (ITE) programme, entry and exit concept maps, and observation of authentic activity, online reflective journaling, and semi-formal interviews. The use of multiple case studies allowed both micro and macro data analysis to discern similarities and differences in the results across all participants involved (Creswell, 2009). A comprehensive cross-case analysis enabled an in-depth comparison to be conducted.

Data analysis identified the factors that influenced the preservice TE students' professional identity, which enabled conclusions regarding their future identities to be made (Forret, Edwards, Lockley & Nguyen, 2013). The findings are interpreted through a Logic Framework Model (Wyatt Knowlton and Phillips, 2013), which demonstrates how preservice TE students' identity can be re-shaped. The model includes a consideration of the attributes of their initial identity. It demonstrates how these initial identities are influenced by interventions in the ITE programme, and how the interventions cause changes in values and beliefs, understandings and pedagogy, knowledge, skills and attitudes, and in a shared cohort identity. As a result, the preservice TE students' evolved professional identities can be viewed via an interrogation of the Logic Framework Model.

This thesis makes an important contribution to the field by identifying the factors that promote professional identity change in preservice TE students. The research findings will inform higher education ITE programmes, whose aim is to promote a transition of a preservice student's professional identity.

Overview

The Technology Education (TE) curriculum in Australia has undergone change over the past forty years, and with a national curriculum on the horizon, there is more to come. These changes and a



lack of understanding about what TE entails have resulted in the fragmentation of groups of TE teachers (Harfield, 2014a; Seemann, 2003; Williams, 2012). The Australian Curriculum: The Technologies clearly defines what TE involves, and The Australian Institute for Teaching and School Leadership (AITSL) has developed a set of graduate teacher standards that preservice students must achieve before they begin teaching.

Many preservice TE students, especially those transitioning from industry, enter the Initial Teacher Education (ITE) programme believing that they will teach their professional skills using a didactic, lockstep, master-and-apprentice approach. The impact of the current and future curriculum based on a contemporary, design-thinking, project-based learning approach leaves them in conflict, wondering exactly what and how they will teach the critical thinking required in TE. These internal conflicts need to be resolved and their professional identity transitioned if they are to become effective TE teachers.

The NSW Board of Studies, Teaching and Educational Standards (BOSTES), now known as NSW Education Standards Authority (NESA) explains that TE involves the teaching of two or more subjects from The Australian Curriculum: The Technologies. Preservice TE students faced with ongoing curriculum changes during their ITE programme, generate tensions and conflict between their initial and anticipated professional identity. The reconciliation of these tensions and conflicts is required to enable the effective transition of a preservice TE student to a TE teacher. This study focused on the professional identity changes required to support the modifications to the TE curriculum and sought to identify a way to promote professional identity transition.

In 1991, the NSW TE curriculum moved from a skill based, lockstep curriculum to a technology curriculum focusing on design and critical thinking. Almost three decades later, teachers are still resisting this change (Turner & Seemann, 2004; Walmsley, 2008). A few teachers are implementing contemporary changes such as fully utilising technology in the classroom (Leonard, Fitzgerald, & Bacon, 2016), integrating blended learning situations (Alammary, Sheard, & Carbone, 2014), using flipped classrooms (Howitt, & Pegrum, 2015), integrating e-learning (Weng, Tsai, & Weng, 2015) or considering the vertical integration of subjects using a science, technology, engineering and mathematics (STEM) approach (Doe, 2016; McAuliffe, 2016a).

This resistance to change has resulted in a fragmented schema of TE (Williams, 2012) whereby preservice TE students and new graduates find it difficult to clearly define what TE entails, to locate their situational professional identity (Hamilton, & Pinnegar, 2015), and implement the expected curriculum changes (O'Connor, & Scanlon, 2005).

The Smarter Schools: Improving Teacher Quality National Partnership (ITQNP) (Australian Government, 2009) has signalled a coordinated approach to more rigorous standards for teacher education. AITSL, which is a government body responsible for implementing reformed accreditation standards for ITE, has developed a set of graduate teacher standards. This process



provides a framework for continuous improvement and increased public confidence in teacher education (AITSL, 2010) through quality assurance and the creation of a national teaching workforce. These teachers will need to transition their identity to meet the graduate standards as set down by AITSL.

If preservice TE students and TE teachers continue to resist a changing TE curriculum, there is a risk that they might not comply with the AITSL (2010) standards number two “Know content and how to teach it.” that graduates are expected to achieve in order to teach in Australian schools. As the TE curriculum changes, teachers need to acquire the new understandings of what to teach and how to teach it. There is a need, therefore, to investigate how the transitioning of professional identity may be supported in order to, promote change imperatives in their classrooms.

Curriculum Change, Tensions and Resistance

Change and reform occur frequently in the TE curriculum. Technological advancements and changes in teaching pedagogies have affected the TE curriculum, workplace activities and employment opportunities for current and future generations. These impacts have resulted in growing support for both curriculum change and school reform (Lynch, Madden, & Doe, 2015). Throughout Australia, changes occur as governments impose technological, political, cultural, welfare and educational changes upon teachers (Bell, 2015). Design thinking and project-based learning are promoted in the Australian Curriculum: The Technologies, and are supplemented with contemporary changes, including the introduction of: blended classrooms wherein integrating technology-based activities are used as a method of teaching (Banas, & York, 2014); flipped classrooms (Howitt, & Pegrum, 2015); and integrated subject learning as STEM or STEAM (Boy, 2013; Doe, 2015; McAuliffe, 2016b). These continue to add change imperatives to the curriculum.

The implementation of a design-based holistic technology curriculum has forced teachers to re-examine their professional identity. These curricular changes have resulted in confusion for TE teachers (MacGregor, 2013a) and a fragmentation of the teaching of TE. The main barriers to the implementation of curriculum change are a lack of agreement of, and understanding about, what TE encompasses, and a clear description of TE schema (Forret et al., 2013; Williams, 2009). A preservice TE student’s understanding of the nature of technology heavily influences their perceptions of TE and consequently shapes their teaching practice (Forret et al., 2013).

Teachers might resist this change, because many believe that the increasing use of technology applications in the classroom dehumanises the teaching process, and this conflicts with their values (Howard, & Mozejko, 2015). Thus, the more complex the change, the less likely a teacher is to implement it; there is sometimes ignorance where the teacher has a lack of understanding about the change, and these results in a fear of failure regarding implementation (Howard, & Mozejko, 2015). In view of the resistance from current technology teachers to the paradigm change, it is necessary to study the professional identity shaping of preservice TE students (Smith, 2007).



Promoting Professional Identity Transition

The participants in this study enrolled in a TE Foundation course embedded within a Bachelor of Education - TE programme. The latter is a compressed delivery programme of a two-and-a-half-year duration, completing three and a half years of university course work over a two-and-a-half-year period. The condensed programme consequently means that professional identity transition will occur in a short period. This programme is only available to students with: a technology-related industry background, a minimum of six years' work experience, demonstrated success in ongoing learning and a range of personal attributes. Students enter the teaching programme on a competitive basis through an analysis of an evidence-based entry folio prepared by the applicant.

This research, based on the ontology of experience (Clandinin, 2007) used reflective narratives to capture the preservice TE students' life stories. It is these stories that have provided insight into the preservice TE students' professional identity. Identity is not viewed as static or fixed; instead, identity is framed using language formation where changes in professional identity are described by a socialising process that shapes identity (Woolfolk, 2007; Zare-ee, & Ghasedi, 2014). This identity formation involves both identification and negotiability (Maynard, 2011). Identity is shaped by a lifetime of activity and interactions including past and present personal and professional life experiences (Day, Kington, Stobart, & Sammons, 2006; Furlong, 2013), prior university courses (Smith, 2007) and school and community based encounters and collaborations (Rodríguez-Sabiote, & Gallego-Arrufa, 2015; Woo, 2015).

Lev Vygotsky, in 1978, coined the term “social constructivism”, arguing that cognitive functions originate in, and are products of, social interactions. Learning is not just the assimilation of new knowledge; it is the process used to integrate learning into a knowledge community (Creswell, 2009; Lincoln, & Guba, 2000). A key assumption in the constructivist classroom is that what the student currently believes, whether correct or incorrect, is important. In this study, all TE student beliefs and understandings were valued and built upon allowing open discussion of all perspectives. The researcher assumed that despite the preservice TE students having the same learning experience, each TE student will base their learning on the understanding and meaning personal to them. Constructing meaning is an active and continuous process, the TE students understanding changed as they progressed through the coursework, completed activities and experiences that challenged and expanded their thinking.

Learning, involved some conceptual changes, the student's conceptual understandings about TE were to move from a traditional, hand on, approach to TE to one that focusses on problem solving. In order to do this, it is necessary to acknowledge that when students construct a new meaning, they may not believe it but may give it provisional acceptance or even rejection. As constructing meaning is continuous, understandings will evolve over time as the students undertake the responsibility to learn more about imposed concepts.



The preservice TE students' transitioning professional identity evolves through social constructivism, such as, social group membership (Hooley, 2007). Here the preservice TE students share a common goal of becoming a TE teacher and share characteristics such as dignity, pride, respect, shared values and beliefs. As they work together to achieve their goal, their professional identity will be impacted upon through social constructivism. This research, based on the ontology of experience (Clandinin, 2007) the ethnology of cultural experience, uses reflective narratives to capture the preservice TE students' life stories. The learner's environment transmits the cultural tools, which include language, cultural history, social context and electronic forms of information access. It is these stories that provide insight into the preservice TE students' professional identity.

This study examines how preservice TE students' professional identity adapts during the TE Foundation course in the first semester at university. The first semester at university is of prime importance, as this is when the greatest professional identity change occurs (Atkinson, 2012). This study explores how aspects of the course context shaped the professional identity of the preservice TE students. The TE Foundation coursework is underpinned by research in TE. The goal being to create a course that will clarify issues, reduce tensions and assist in the transitioning of the professional identity of preservice TE students. The intervention coursework will include sharing life histories and will build trust and rapport to unify the students so that these connections will encourage identity evolution. The specific TE Foundation coursework strategies, involving problem solving in authentic learning, community of practice, and the journaling of reflective narratives, will contribute to the preservice students' professional identity transition from trade workers to preservice technology educators.

Methodology

The case study used qualitative research to explore changing behaviours, perspectives, feelings and experiences of preservice TE students, in order to identify the factors that have affected their professional identity. This qualitative case study method facilitated exploration of the phenomenon using a variety of data sources. This exploration of the changing professional identity used a variety of lenses allowing for understanding of multiple facets of the phenomenon. The research techniques and tools included concept mapping, reflective journaling, observing and interviewing, within the wider qualitative framework of a case study.

Research Design

This research design used a multiple case study approach. Case study research assumes that examining the context and other complex conditions related to a case are integral to understanding a case (Yin, & Davis, 2007). The relevant case study data comes from multiple sources of evidence including entry folios, concept maps, reflective journals and semi-structured interviews that are used to triangulate results. The data analysis techniques included demographic and interpretive analysis, relational scoring, time series analysis and evaluation using the Logic Framework Model. The Logic Framework Model provided a technique for scrutinizing and undertaking an evaluation of the change in a cause and effect process where the participant's identity was analysed.

Interventions affected their identity that resulted in initial outcomes followed by ultimate outcomes.

The data collected provided extensive evidence to respond to the research questions. The link between the research questions, the data sources and the data analysis are in Table 1. below. This table lists five data analysis strategies – pattern matching, interpretive analysis, relational scoring, and time series analysis, beside links to the data sources associated with each strategy and the use of the Logic Framework Model.

Table 1: Linking Data to Analysis to the Logic Framework Model

Research questions	Data Source	Type of Analysis	Cross comparison Logic Framework Model
RQ1. Initial professional identity.	*Student entry portfolio *Interview *Initial concept map	* Demographic data *Pattern matching *Interpretive analysis * Relational scoring	ATTRIBUTES Characteristics of initial professional identity.
RQ4. Factors affecting the professional identity.	*Online journaling *Interview *Exit concept mapping	*Pattern matching *Time series analysis *Interpretive analysis *Relational scoring	INTERVENTION A list of the activities and resources that influenced the changing professional identity.
RQ2. Changes in the professional identity	*Online reflective journaling *Interview *Observation	*Pattern matching *Time series analysis *Interpretive analysis *Interpretive analysis	CHANGES The reactions, assertions and initial changes after the interventions and the interactions.
RQ3. Final Professional Identity	*Online journaling *Interview *Observation	* Pattern matching * Time series analysis *Interpretive analysis *Interpretive analysis	OUTCOMES The professional identity changes at the conclusion of the TE Foundation course.



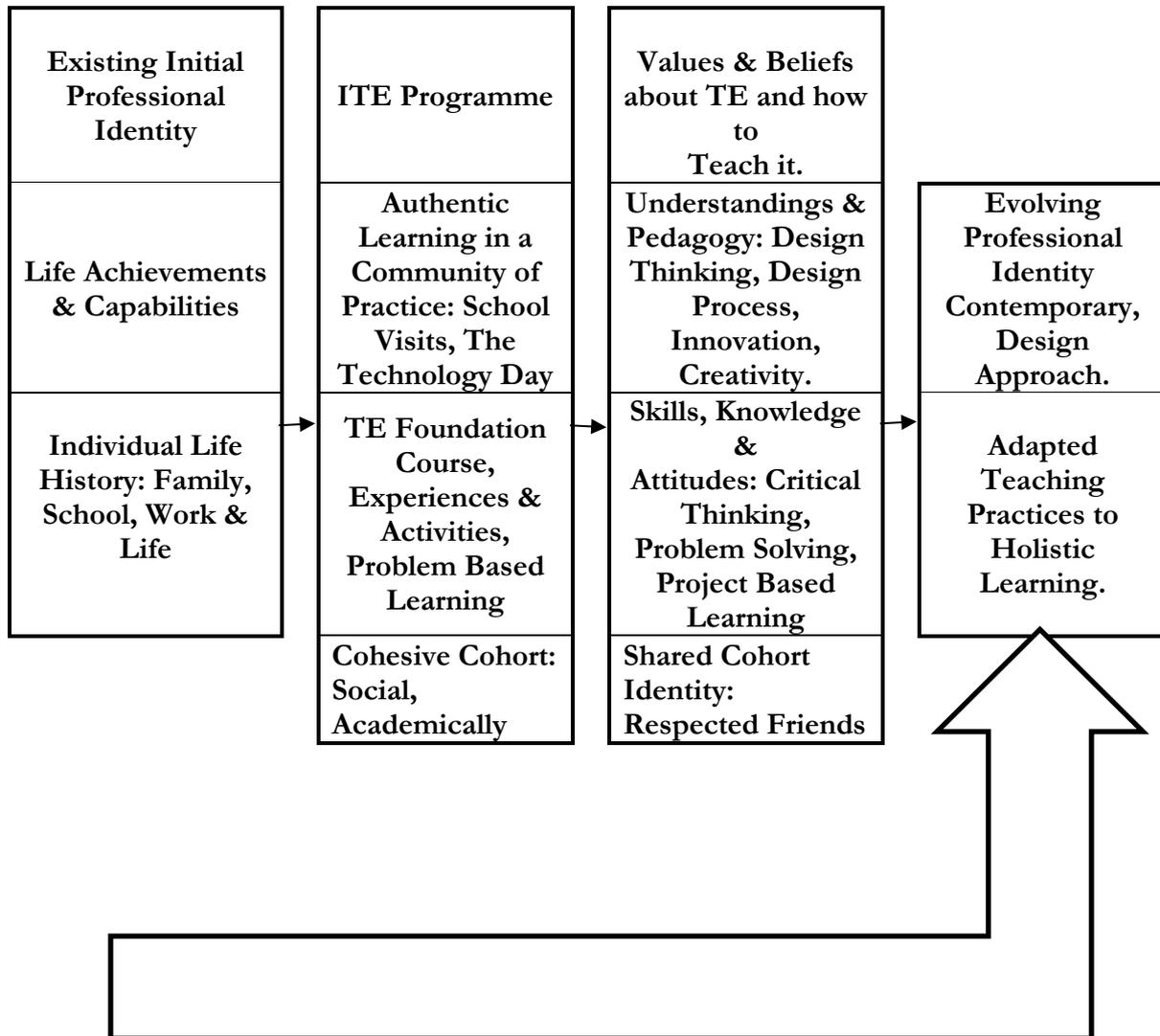
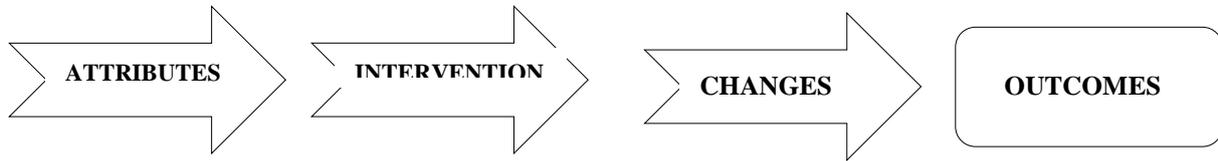
Findings

The findings from this study suggest that professional identity is re-formed by the interconnection and the layering of life-influencing factors, such as life histories, university study, activities and interactions within the cohort, working together within communities of practice and school contexts. Developing preservice TE students' professional identity is a complex, challenging, relational and multifaceted process. Each of the study's participants successfully combined the influences from their past, their present TE Foundation coursework, the ITE programme and authentic activities within school contexts to develop a powerful social psychology to inform their evolving professional identity.

The Logic Framework Model, as viewed below, demonstrates that preservice TE students enter the ITE programme with pre-determined ideas and attributes demonstrating their future identity as a TE teacher. The attributes shown in the initial identities were affected by interventions. These included aspects of the ITE programme, including the TE Foundation course that provides intellectual, academic and social activities and experiences. These interventions resulted in changes in thinking, understandings and teaching that demonstrated an evolved professional identity embracing a contemporary approach to TE. The demonstrated professional identity change moved from one that focused on a traditional, didactic, master-and-apprentice approach to a contemporary professional identity that focuses on a holistic approach to TE. This contemporary identity aligns with the approach promoted in *The Australian Curriculum: The Technologies*, which utilises a holistic approach incorporating design thinking (ACARA, 2015).

The four research questions guiding this study inform each section of the Logic Framework Model. Research question one informs us of the participants' initial professional identity attributes. The intervention section of the Logic Framework Model is informed by the responses to research question four, which asks how the foundation course affected on the transition of the professional identity of preservice TE students. The changes in the Logic Framework Model (Figure 5.1) are informed by research question two and the outcomes in the Logic Framework Model are informed by research question three, which examines preservice TE students' professional identities at the conclusion of the course.

Logic Framework Model: A Changing a Professional Identity



<p>Attributes: The attributes refer to the characteristics of the initial professional identity belonging to the participant informed by research question one.</p>	<p>Intervention: The intervention is the set of activities that the participant experiences that cause a change in their identity informed by research question four.</p>
<p>Changes: The changes occur because of the interventions. They are characterised by changes in identity, beliefs, attitudes, thinking and behaviours informed by research question two.</p>	<p>Outcomes: The ultimate outcomes are the long-term changes that occur after the changes from the intervention informed by research question three.</p>

Figure 2 : Logic Framework: Changing Professional Identity

Conclusion

In the world where change is the constant, TE curriculum reform is the norm. Many TE teachers continue to resist these changes, resulting in a fragmented schema of TE (Williams, 2012) whereby preservice TE students and new graduates find it difficult to clearly define what TE entails, to locate their situational professional identity (Hamilton, & Pinnegar, 2015) and to implement the expected curriculum changes (O'Connor, & Scanlon, 2005) and graduate standards that AITSL (2010) have produced. To prevent this from occurring, preservice TE teachers need to embrace change and reconcile internal conflicts in order to evolve their professional identity. The findings from this study provide a pathway for tertiary technology educators to begin this important process.

This study showed that the pathway that preservice TE students follow when facing change that confronts existing values and beliefs. The ontology and support of initial values and beliefs are essential. Those who are facing conflicting values and ideals and undergoing identity challenges because of an altered TE curriculum may resist using the ideas promoted in the new curriculum. To help promote professional identity change, the strategies that support the evolving professional identity include valuing the TE student's life history, building a rapport between students and tutors and between students that contributes to a unified identity theory. In the coursework, the preservice TE students need to experience mentoring, authentic activities in a community of practice. These strategies presented to the students must include opportunities to reflect and evaluate, without being told what to think. They each must reflect upon and evaluate their learning as they contemplate their changing professional identity.

At the beginning of a foundation course, taking the time to get to know and understand each of the students is essential to their success. To find out about their background, life experiences and



their existing values, the tutor must understand where the students are coming from, by listening closely to their personal contributions. The tutor must respond by providing positive reinforcement and an explanation of how the TE preservice life history contributed to learning in the classroom. A rapport must exist between the students within the class and between the tutor and the students in order to build an environment that is conducive to a social constructivism situation. Students who share common characteristics, beliefs and values are encouraged to work together and share their existing and evolving values. When working together using cooperative and collaborative learning the preservice TE students will work together to help build a unified group identity where students respect each other and share developing opinions as they evolve throughout the semester.

In the planned coursework, mentoring evolves professional identity. The respect built with the tutor, and between students allows shared, considered and discussed ideas and challenges to evolve their professional identity. When planning the coursework, in order to evolve the professional identity authentic activity needs to be included because authentic activity allows the students to relate learning to the classrooms in which they will be working. Authentic activity within these programs needs to be taught within a community of practice. This allows the preservice TE students to observe evaluate new concepts, comparing them with traditional approaches that are used. This challenges their thinking as they link the outcomes of the observed activities to their thinking.

If identities are to evolve, the students need to use the concepts in a classroom without fear of retribution and with no marks allocated. The preservice TE students must be encouraged to risk using new processes and trial them before evaluating their teaching practices. To consider possible identity changes and changes in teaching activity it, all preservice TE students must reflect upon their authentic learning activities in their community of practice. These reflections when shared with their respected mentors and group members evaluate and synthesise change to their professional identity.

In conclusion, when designing a foundation course that is aimed at introducing a new concept, or evolving the preservice teacher identity it is essential to share and value student values and understandings. The building of a professional rapport between students and tutor and students encourages this to occur. Observations and reflections on traditional and contemporary approaches used in communities of practices, the provision of authentic learning opportunities where students have the opportunity to experiment and trial new concepts with change paradigm being implemented before evaluating the success of the lesson will evolve a preservice teachers professional identity.



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