



TEACHING & LEARNING
RESEARCH INITIATIVE

NĀU I WHATU TE KĀKAHU, HE TĀNIKO TAKU

CASE STUDY

Changing practice in teacher education through inquiry-based learning

Jae Major

Charles Sturt University, Bathurst, Australia



Abstract

This case study outlines an initiative by a teacher educator that was aimed at engaging student teachers in a primary initial teacher education course with different ways of conceptualising knowledge and learning in the social studies learning area. It reports practitioner research that explored student teachers' responses to the initiative and the nature of their shifting conceptualisations of knowledge, teaching and learning. Shifting epistemological understandings are theorised in relation to knowledge dimensions and realist and relativist perspectives. The initiative that forms the context of the research introduced, and involved student teachers in, inquiry-based learning as a pedagogical process to explore issues relating to teaching culturally and linguistically diverse learners.

Findings suggest that student teachers developed clear understandings of inquiry learning as a dynamic, exploratory learning process that can support diverse students' learning, and that the student teachers understood that the use of inquiry pedagogies challenged assumptions relating to the nature of knowledge and ways that students acquire knowledge. The findings also suggest that both the teacher educator and the student teachers experienced tensions as they attempted to reconcile disjunctions between their older and newer epistemological understandings, and between their ideas and their teaching practice.

Introduction

In 2007, a new national curriculum was introduced to New Zealand schools. This new curriculum signals shifts and changes in the way that knowledge and learning are conceptualised by educators in New Zealand. These shifts and changes reflect theoretical arguments grounded in post-modernity, constructivism and notions of twenty-first century thinking that 'emphasise the need for a reconceptualisation of knowledge and learning in educational policies and practices' (Andreotti, 2010, p. 1). The new New Zealand Curriculum (NZC), then, marks a move towards a potentially different kind of education.

The shifts in thinking about knowledge and learning implied in the NZC have been referred to as a paradigm shift (Bull, 2009; Gilbert, 2005) from twentieth to twenty-first century thinking. Knowledge in twentieth-century thinking is described as fixed, stable and something that exists 'out there' waiting to be discovered. In this paradigm, teaching and learning take place through the transmission of existing knowledge into learners' minds. In contrast, twenty-first-century thinking views knowledge as fluid, complex and uncertain and constructed in social contexts as people seek to make sense of their world. Teaching and learning in this paradigm are dominated by processes where knowledge is viewed as relational, a network or flow, and the aim is to use knowledge to make things happen (Gilbert, 2009). These contrasting paradigms are also described as the industrial age and the knowledge age. What these contrasts suggest in theoretical terms, is a shift from a realist perspective towards a more relativist perspective, reflecting a movement towards post-modernity.

As a teacher educator, academic and practitioner, the introduction and implementation of a new national curriculum prompted my engagement with notions of epistemological shifts. Through the Teaching and Learning Research Initiative (TLRI) project, I have explored this in relation to three inter-related areas of interest. Firstly, in considering that the NZC implies and is predicated on shifting conceptualisations of knowledge, I was interested in how this might translate into personal epistemological shifts experienced by students in an initial teacher education programme, as they engaged with new ideas about knowledge and curriculum. Secondly, I was interested in the potential of the NZC to promote culturally responsive practices among teachers through the principles and pedagogies espoused in the document. Thirdly, while the NZC applies to compulsory schooling contexts (primary and secondary levels), it has significant implications for teacher education. Through the process of engaging with the investigators leading the TLRI project, and a range of activities they implemented to challenge tacit knowledge, I became increasingly dissatisfied with the lack of alignment between my changing theoretical understandings and beliefs, and my pedagogical practices. This project offered a context where I felt supported in the clarification, critical examination and expansion

of the possibilities of my thinking and professional practice. It prompted me to look more closely at the (mis) alignments between my theoretical understandings and beliefs and my pedagogical choices.

To address the three elements of the study I reconsidered the pedagogical processes that I used in a year-long course I was teaching in the Graduate Diploma of Teaching (primary), with a view to enacting practices that better reflected the principles implied in the NZC. This course had a focus on the social studies curriculum, multiculturalism and teaching for diversity. I decided to incorporate into the course, inquiry-based learning as a pedagogical approach because it supported twenty-first century notions of knowledge through framing learning as a process of active meaning making rather than passive knowledge reception.

In the first part of this paper I outline the theoretical framing of the study, discussing epistemological shifts and the place of inquiry in the NZC. Next I describe the research design, before reporting the findings in relation to student teacher shifts in conceptualisations of knowledge, their understandings about, and perceptions of, the benefits and limitations of inquiry-based learning, and the tensions I experienced in the use of inquiry-based learning in my teaching practice.

Understanding epistemological shifts

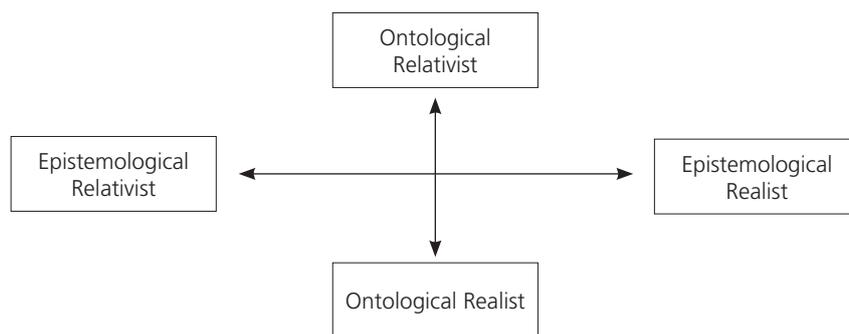
This project is grounded in post-modern conceptualisations of epistemology where knowledge is understood as a process of meaning-making characterised by relationality, fluidity and a sense of relativism. Recent research into teachers' epistemological beliefs has proposed a number of models and dimensions to describe changes in personal epistemologies over time and in response to education (Baxter Magolda, 2004; Hofer, 2004; Hofer & Pintrich, 2002). Barbara Hofer (2004) synthesises a number of models of personal epistemology and describes two areas and four dimensions of beliefs about knowledge and knowing. The two areas are the nature of knowledge and the nature of knowing. Within each of these areas are four dimensions: certainty of knowledge, simplicity of knowledge, source of knowledge and justification for knowing. Hofer describes these four dimensions as comprising 'the core of what have been called *epistemological theories*, an integrated, relatively coherent structuring of related beliefs' (2004, p. 131). Each of the dimensions operates on a continuum as shown in Table 1.

Hofer's model is based on the notion that shifts in epistemologies reflect movement between more realist and more relativist understandings of knowledge and knowing. This matrix structure provided a lens for understanding the student teachers' concepts of knowledge and knowing.

Table 1 Dimensions of the nature of knowledge and knowing	
Dimension	Continuum
Certainty of knowledge	Absolute truth ←————→ Tentative and evolving
Simplicity of knowledge	Discrete facts ←————→ Relative contingent and contextualised
Source of knowledge	Originating outside the self ←————→ Actively constructed in interaction with the environment and others
Justification for knowing	Observation, authority, what feels right ←————→ Evaluation of evidence, expertise, views of experts

Schraw and Olafson (2008) combine epistemological beliefs and ontological beliefs on to a matrix designed to provide insights into levels of realism or relativism. Two intersecting continua create a matrix with four quadrants as in Figure 1.

Figure 1 The four-quadrant scale (Schraw & Olafson, 2008)



Schraw and Olafson offer this model as a way of mapping teachers' ontological and epistemological beliefs in relation to each other. Their preliminary findings suggest that teachers tend to cluster in the quadrant of ontological and epistemological relativism. However, some teachers' responses map into the quadrants of both ontological relativism and epistemological realism. This suggests that there may be disjunctions between espoused ontology and lived epistemology, the reasons for which need further study. A tendency towards more realist or relativist beliefs about teaching and learning has implications in the classroom. Realist teachers may tend to perceive teaching as transferring knowledge from teachers as experts to students as naive and passive learners, while relativist teachers may promote learning activities in which students collaboratively construct knowledge and are expected to justify their knowledge claims.

Inquiry in the NZC

In the new NZC, the idea of knowledge as a verb takes form in the conceptualisation of 'teaching-as-inquiry', which is presented as a necessary component of effective pedagogy. Teaching-as-inquiry is a means of ongoing teacher learning and improvement where 'teachers inquire into the impact of their teaching on their students' (NZC, 2007, p. 35) and is guided by key questions:

What is important (and therefore worth spending time on), given where my students are at? What strategies (evidence-based) are most likely to help my students learn this? What happened as a result of the teaching, and what are the implications for future teaching? (NZC, 2007, p. 35)

This process implies that teachers need to continually interrogate their practice with a focus on improving outcomes for learners. This process is grounded in twenty-first century notions of generating and using knowledge for particular purposes, as teachers are prompted to generate questions about their practice, and to use evidence and research to improve their future pedagogical decisions.

In the NZC, inquiry is also a central pedagogical process in the social studies learning area. According to the NZC, in a social inquiry, students:

ask questions, gather information and background ideas, and examine relevant current issues; explore and analyse people's values and perspectives; consider the ways in which people make decisions and participate in social action; reflect on and evaluate the understandings they have developed and the responses that may be required. (2007, p. 30)

This constructivist conceptualisation of inquiry also involves a strong critical orientation promoting the interrogation of taken-for-granted assumptions. Drawing on the work of Kulthau, Maniotes and Caspari (2007), my understanding of inquiry includes aspects of learner choice and ownership (including questions generated by learners themselves); connections with the world of the learners and social interaction; the development of higher order thinking skills and 'learning to learn'; a cycle of action and reflection; and a recognition of diverse ways of learning and knowing. In this sense, inquiry is a valuable strategy as it is

motivating and engaging for learners, well-suited to collaborative learning, interdisciplinary, appropriate for any age and positive for diverse learners whose ‘funds of knowledge’ are often ignored and devalued in traditional curricula (Education Development Centre, n.d.).

In the context of this project, an inquiry-based approach offered a pedagogical process for creating knowledge, negotiating meanings, and using knowledge for particular purposes in particular contexts. In other words, it encapsulated many elements of knowledge implied in the NZC and thus seemed to be a tool that I could use to:

1. demonstrate to student teachers how new conceptualisations of knowledge could be put into practice
2. engage student teachers with content related to culturally responsive teaching
3. achieve a sense of alignment between my pedagogical beliefs and practices.

Methodology and research design

This qualitative case study was designed to explore student teachers’ conceptions of knowledge, their response to inquiry-based learning, and my own responses to introducing this new approach into my practice. Central to the study was active reflexivity which ‘demands that we interrogate [...] the ways in which research efforts are shaped and staged around the binaries, contradictions, and paradoxes that form our own lives’ (Lincoln & Guba, 2000, p. 183). This research was very much concerned with the ‘binaries, contradictions and paradoxes’ that both I and my students experienced through the incorporation of pedagogical practices that aligned with new conceptualisations of knowledge signalled by the NZC.

Setting, participants and data collection

The study was set in my workplace, a college of education in a university, and within my professional role as a teacher educator. As already stated, the study was contextualised in a course in the Graduate Diploma of Teaching (primary). Although the majority of the cohort of students in the graduate diploma programme was New Zealand born Pākehā/European, the group was relatively culturally diverse. There was a sizable group of international students from Canada, many of whom had experienced French immersion schooling. In addition there were students from a range of cultural and language backgrounds including New Zealand Māori, Pasifika, Chinese, Korean and Indian.

Fourteen students (out of 55) consented to participate in the research from the first day of the course. Of these, six agreed to participate in interviews. These six students were all Pākehā, and all except one were New Zealand-born. They ranged in age from early twenties to late fifties, and had a variety of life experiences. General information about these six students, who are the focus of data used in this case study, is presented in Table 2.

Kerri	Female Late 20s	History graduate. Lived and worked in Japan for 3 years teaching English.
Peter	Male Late 50s	Recently migrated from England to live and retrain as a primary teacher. Had taught in secondary schools in England.
Grant	Male Late 30s	Retraining as a primary teacher after teaching at secondary level for some years. Brought significant teaching experience to the programme.
Heather	Female Early 50s	Artist with an interest in social justice and working creatively with children.
John	Male Early 20s	Just finished his first degree. Developing ideas about self as a teacher and about teaching in the 21st century.
Beth	Female Early 20s	Interested in alternative pedagogies. Planning to train in the Rudolf Steiner approach after completing teaching qualification.

Data collection occurred throughout the year and involved five data collection tools. Initial baseline data was collected using a survey (common to other case studies in this project) that was incorporated into the course and completed by all the students. A modified form of the survey was used again at the end of the data collection period. The survey explored student teachers' ideas about key concepts through a range of sentence starters such as 'Knowledge is ...', 'Curriculum is ...', 'Teaching is ...'. Personal reflective journaling was used to record my own developing ideas about knowledge in the NZC, my teaching decisions and responses to challenges—both ideological and pragmatic. Course tasks that provided data included concept maps, inquiry response sheets and a social inquiry planning task. The inquiry process formed the basis for semi-structured interviews which were conducted either with pairs (Kerri and Peter; John and Beth) or individual participants (Grant and Heather). The interviews explored participants' responses to inquiry as a means for developing understandings of knowledge, and their views about the benefits and limitations of this approach to learning. In addition, one of the principal investigators observed two classes where the student teachers were presenting the outcomes of their inquiries. Ongoing discussions with her about how she perceived the process enhanced my analysis of student shifts in thinking and their responses to the inquiry task.

Pedagogical initiative

In order to facilitate an understanding of knowledge as generative and performative, and to meet course learning outcomes related to diversity and inclusion, I introduced the pedagogical strategy of inquiry into the course both as content and as process. I redesigned the course so that students would undertake their own inquiries using school-based scenarios related to cultural and linguistic diversity. The scenarios provided the prompt for students to develop questions and engage with a range of resources. The scenarios related to bilingual education, first language maintenance, inducting new migrant and refugee children and families, understanding the experiences of new migrant and refugee children and families and school programmes for children with English as an additional language. Each scenario posed a 'problem' in a school context that the student teachers (positioned in the role of teachers) had to research and offer solutions for. For example, the scenario related to first language maintenance read:

Several teachers at your school have been complaining that some children are using their first language in the playground and classroom. They say that only English should be used and want the school to make a policy that says this. Some of the parents of culturally and linguistically diverse children agree and want their children to use only English at school too. Other parents are against this and are trying to maintain their first language in the home so their children grow up bilingual. They do not want their children to forget their first language. There is a staff meeting coming up and the principal has asked you to present on the issue and lead a discussion.

After choosing a scenario the students worked in small groups to undertake their inquiries. They were briefed to develop key questions to guide their inquiries and engage with provided readings, with other resources and with people outside the course and the university to help them address their questions and the issue raised in the scenario. After a few weeks, each group had to choose a medium to present their findings to the class. This approach to learning was quite different from the usual organisation where students attended lectures and tutorials. They were expected to independently engage with the resources and develop understandings about cultural and linguistic diversity in education. I did not actively teach the content implied by the scenarios but met with the groups to guide and support them.

Data analysis

The data were analysed using Hofer's (2004) dimensions of knowledge and knowing (Table 1) to identify the participants' positioning and movement in personal epistemologies. I created a table for each dimension and extracted quotations from each participant's interview data that reflected that dimension. Notions of realism and relativism informed my consideration of the tensions and contradictions that I experienced in introducing inquiry as a pedagogical process. In order to talk in a more nuanced way about the spaces between realism and relativism that I was experiencing, the project team developed the notions of contextual realism and contextual relativism (Andreotti & Major, 2010). These terms are explained in the findings section along with the table which I developed to represent my interpretation of these spaces in relation to my teaching decisions.

Findings

Two layers of analysis are discussed in the next section. The first relates to the students participating in the research: their engagements with, and developing understandings of, inquiry and their shifting conceptualisations of knowledge. The second layer is related to my pedagogical practices and my response to the introduction of inquiry as a pedagogical tool.

Student understandings about inquiry

There was significant evidence that the student teachers I interviewed had developed clear understandings about inquiry as a process for building and managing knowledge and skills in the classroom. Words such as 'explorative', 'dynamic', 'experimenting', 'not linear' were used to describe the inquiry process. There were also suggestions in their words of developing notions of knowledge as a verb, as something generative and performative as the following quotations indicate.

[Inquiry is] learning skills to access and manage knowledge rather than focusing on the knowledge itself. (Kerri)

[Inquiry is] about what you can do rather than what you know so much. (John)

The difference [to traditional teaching] isn't the knowledge, the difference is how we acquire that knowledge. (John)

A second notion that came through in the interviews was the power of inquiry to introduce new perspectives and opportunities to challenge taken-for-granted knowledge and beliefs. According to Heather, inquiry is a way 'to develop new knowledge, to also practise skills for handling dissonance ... and also for having practice at understanding other people's points of view, too'. Kerri also felt that inquiry enabled a range of views to be explored and challenged in constructive ways. The scenarios deliberately raised some common assumptions expressed by teachers relating to cultural and linguistic diversity. The readings I provided challenged these assumptions. It was clear in the group presentations that there was a variable response to some of the new and different perspectives that the resources provided, prompting discussion as the student teachers questioned one another.

There was also strong engagement with the idea that inquiry was driven by learners' interests and needs. The student teachers were enthusiastic about the motivational power of giving learners choices, and they talked about the importance of 'buy-in' and student ownership. This aligns with the vision of the NZC for life-long, independent learners, and placing the learner at the centre of the learning process. These notions seemed to resonate for the student teachers in terms of their own learning experiences.

However, it was acknowledged that moving towards a less teacher-directed pedagogy also meant that they, as teachers, would have to be prepared to share responsibility and 'let go'. This led to a sense of tension for some around the balance between teaching the skills necessary for successful inquiry and the notion of learner choice. Beth spoke of the teacher needing to coach learners and scaffold skills, while Peter said that inquiry was 'directing the children in such a way that they can get the information that they need'. Peter seemed to see the teacher as the centre of the teaching/learning process and he understood inquiry as offering more enjoyable ways to 'bring information out of children'. There is a challenge here in moving from a teacher identity grounded in being a source of knowledge and the decision-maker in the learning environment, towards an identity as co-creator of knowledge and meaning, with some implied loss of authority. Peter was not alone in expressing this. The inherent paradox here lies in the need for teachers to know a lot about what they are teaching, not in order to tell children and control the process, but in order to guide and support learning.

A sense of tension was also apparent in the understanding that most students had about inquiry being operationalised in two ways. The first was as a pedagogical tool which they felt was often implemented somewhat superficially in classrooms, and the second was as a teaching/learning philosophy that guides how a teacher enacts the curriculum and pedagogical practices. Grant described the notion of inquiry as a pedagogic tool.

I haven't seen a lot of inquiry happening in schools, myself, but based on what others have said on ... well, they've witnessed on their teacher practices, it's ... they said it's not genuine inquiry, because it's pretty much predetermined. They'll brainstorm things with the kids, but pretty much the teacher will, without the kids realising, will channel them in exactly the direction they wanted it to go anyway.

Beth and John also discussed this distinction, with the same conclusion that a 'real' inquiry did not have a predetermined end point, but was more open and explorative.

Beth: I see it as children owning their learning. So, taking ownership for the process, instead of being spoon-fed, hopefully. Or being told. Like, just exploring and experimenting, and finding out via trial and error, and not knowing where they're going, but getting there.

Jae: Do you think that inquiry can work if you don't kind of take it on as a philosophy, rather than just as a tool?

Beth: Not as well, I don't think so.

John: Not really, it's because it's quite narrow, isn't it? So, and generally when it's not a philosophy, it's just a tool, you've got an end place in sight already, so it's not proper inquiry.

This sense of more structured, teacher-directed inquiries not being authentic came through in several of the interviews, and while the interviewed students seemed to value the notion of inquiry as philosophy, there was also a sense that this could be difficult to achieve. Grant described inquiry as more demanding than traditional models of teaching, but felt that it was exciting as well. Beth expressed the attraction of inquiry as philosophy thus:

And knowledge develops, eh, that's the whole thing about inquiry. When I said 'they don't know where they're going' ... they're finding the knowledge, and they're building on it, and they're going to places that you couldn't take them yourself. And that's the beauty of it.

There was a sense of uncertainty about the viability of undertaking inquiry that I felt related to the student teachers' lack of classroom experience and confidence in their ability to manage the complexities of the process. It may also relate to ongoing shifts in their understandings of knowledge and how it is conceptualised in the NZC. I think it also points to tensions in teachers' decision-making related to these shifts and the challenges in sustaining them in practice.

Student teachers' perceptions of the benefits and limitations of inquiry

Related to the student teachers' understandings about inquiry, were their ideas about its benefits, both as a pedagogical process and as an experience in their teacher education programme. Heather, for example, spoke of inquiry developing social knowledge and skills for managing relationships, communicating and relating to others. The role of multiple perspectives and resources that challenged taken-for-granted knowledge was identified as important for appreciating other points of view. As Peter put it, 'it enabled me to embrace much more about where people are coming from'.

Teacher education programmes tend to be fairly prescriptive due to their professional nature and the requirements of accrediting bodies. Inquiry is relatively un-prescriptive and more open to learner direction. I was interested in how the participants felt about their inquiry experience in the course. Several mentioned that the inquiry provided them with an opportunity to use their prior knowledge and experiences as resources within their inquiry. Heather, however, expressed a desire for more explicitly sanctioned opportunities to draw on others' knowledge, rather than just using books and websites. The freedom to choose the focus of their inquiry (within set options) and how to manage the process were viewed as beneficial, and the process itself helped affirm some participants' commitment to constructivist approaches to teaching and learning.

The inquiry provided student teachers with the opportunity to undertake their own research, and the new understandings gained provided them with confidence to discuss and deal with issues to do with cultural and linguistic diversity. The requirement to communicate their new understandings to each other was seen as a process of accountability that ensured that most engaged more deeply with the content that they might otherwise have.

In addition to the development of some core understandings related to diversity, engaging in the inquiry enabled the student teachers to develop a better understanding of the process itself. Beth described the process:

The more classes I came to, and the more we did of it ... it was actually near the end where I just sort of went 'ohhh'. You know, you don't suddenly click, you don't suddenly see it, but you almost feel it. The more you do of it, and you're surrounded by it, and learn through it, that's when you get a handle on it.

She went on to say, 'I feel I know a heck of a lot, and I know where to go, and where to find stuff, and what processes to take, but I don't think of your lectures as being lectured at'.

Despite the feedback above, there was also honest and constructive critique of the inquiry process experienced in the course which has provided guidance for ongoing development. The main point made was that the inquiry the student teachers experienced was not an authentic inquiry because the topic was directed, core questions were determined by the scenarios and many core resources were provided. The scenarios that provided the stimulus for their inquiries were described by Heather as 'pretend' and not relating to her own experiences or world, so 'by its very nature it became academic'. There was also a desire to have access to a greater range of resources and experiences to build a sense of the field (or topic) of the inquiry, from which the student teachers could make their own decisions about what to pursue. The final point made was about the importance of the discussions and conversations that arose from the presentations, and the role these could play in deepening understandings. This is what Grant had to say:

I think the other part of it is sort of the celebration part of it, at the end of an inquiry, um, perhaps, just because of time constraints and things, you know, everyone presented, but there wasn't really time to have some, what do I say, like, meaty academic kind of good, professional, robust discussion, and challenging, and 'you said this, well could you explain it a little bit more', or, 'how can you justify saying that?'. Getting some really good discussion going, I think perhaps, we probably would have got more out of it had that happened.

All these are worthwhile points that have informed the ongoing development of the course.

Students' shifts in conceptualisations of knowledge

From the data, it was difficult to detect any clear shifts in student teachers' conceptualisations about knowledge. The survey data were inconclusive and did not clearly demonstrate any development in understandings about knowledge and knowing. There was evidence that some student teachers made a distinction between knowledge and knowing, with knowledge being understood as a noun, and knowing as a verb. The six participants who were interviewed expressed ideas that positioned them towards the relativist end of the continua on most of Hofer's dimensions. It seemed that those who self-selected to participate in the interviews tended to be those who were more aligned to the focus of the new NZC, and this was demonstrated in their course work and contributions to class discussions. It seems that these student teachers did not shift in significant ways in their conceptualisations of knowledge.

Only Peter expressed his understandings of knowledge in ways that indicated a tendency towards a more realist orientation. 'You've got to know your past, you've got to know your history, you've got to know how it interlinks. There's so much ignorance even in terms of government ... how government works, how laws are made ...'; and 'The process of learning knowledge, it's being able to say "this is true and this isn't true" ...'.

Peter emphasised the importance of knowing facts—your past, history, government and so on. There is a sense here of knowledge as fixed and made up of discrete facts or absolute truths that can be learnt. Ignorance is perceived as a lack of knowledge, and the implication is that it is the job of teachers to provide knowledge to overcome ignorance. However, this realist orientation was not consistent, and there were also signs of more relativist thinking in Peter's words. 'It's interpretation of knowledge, I've got knowledge in there but how I view it now is from a different place ... so I understand it differently'; and 'I think it [the inquiry] enabled me to embrace much more about where people are coming from'. Thus Peter seems to be positioned in a space between realism and relativism where matters of context are considered and knowledge is conceptualised as both certain and uncertain.

A more relativist epistemology was evident in the words of other participants.

I've always had that emphasis ... knowledge as uncertain and multiple perspectives. (Kerri)

But, there's a lot of room for ... interpretation. And, also, for changing your mind, is the other thing, depending on that, and I guess that's what gaining new knowledge is really... (Heather)

[In inquiry] you find it out for yourself. So, rather than being taught that the capital of Finland is Helsinki, you'd have to find that out yourself, and actually explore it. And that way you're actually questioning the knowledge that you

get, as well, how reliable is it? Can I trust it? Whereas in the past, and even with my schooling, you trust everything the teacher tells you. (John)

There is recognition here, of the uncertainty of knowledge, the notion of questioning, critique and interpretation that suggests multiple ways of knowing, with no single 'right' answer. And yet, there remained, for most of the participants, a sense of tension in this uncertainty; this space between realism and relativism where the notion of 'knowledge as a verb' was interpreted as referring to skills that could be deployed to construct 'knowledge as a noun'.

The skills and stuff are still important, but I think the knowledge still plays a big part. (John)

I see knowledge as being both [noun and verb] ... I think there's a place for both. I share some of those concerns about the, like for me, there's a bottom line that we don't want society to go below. [...] Because at the end of the day, if you haven't got, sort of, a box of basic knowledge, you've got nothing to work with. So, it's kind of achieving a happy balance, you know? (Grant)

The tensions evident in the participants' talk about inquiry and knowledge mirrored the tensions I felt about the way I used inquiry within the course. I turn now to discuss these tensions.

Negotiating tensions—my experiences

The process of introducing inquiry as a pedagogical tool into my teaching raised a number of tensions that I struggled with throughout the course. As noted previously, these tensions related to negotiating the space between realism and relativism, and the terms contextual realism and contextual relativism were coined to help talk about and understand the space. Both contextual realism and contextual relativism have foundations in post-modern notions of 'knowledge, learning, reality and identities as socially constructed, fluid, open to negotiation and always provisional' (Andreotti, 2010, p. 2). However, they differ in the way in which each understands social issues in society and education, and how these might be addressed.

Contextual realism, also described as cognitive adaptation (Andreotti, 2010), takes the 'post' in post-modernism as meaning 'after'. This suggests that post-modernity is a development from modernity and in the realm of education this is interpreted as meaning that teachers need to adapt their practices to be effective in the post-modern world. The post-modern (twenty-first century) world requires education that produces workers for a 'knowledge society', able to respond to change, generate knowledge and manage it effectively. Teachers, then, must cognitively adapt to understand new ways in which knowledge is generated and managed using digital and traditional media, and to equip learners with skills to manage diversity and uncertainty, complexity and change. In this view, issues related to social justice are about equity and redistribution. Marginalised groups that have been unsuccessful in traditional forms of schooling need to be equipped with the tools to succeed in the knowledge society (whether or not they subscribe to the values inherent in this society).

Contextual relativism, also described as epistemological pluralism (Andreotti, 2010), takes as its starting point an understanding of the 'post' in post-modernism as meaning 'questioning'. In this framework, modernity is questioned with regard to its ability to produce suitable ways of responding to the complex problems that societies currently face. Contextual relativism aims to foster epistemological pluralism ('the pluralisation of knowledge') to counter the inherent violence of current mono-epistemic practices which create coercive processes that disadvantage minority and marginalised groups by imposing particular ways of knowing and being in society (Andreotti, 2010).

In contrast to contextual realism, contextual relativism promotes questioning of the system itself and proposes that teachers should also question 'the system' and re-assert agency by critically engaging with change rather than simply adapting to it. To do this, teachers need to develop the ability to engage with multiple perspectives, particularly those of their students, in order to 'challenge and expand their [the students] boundaries' and enable them to envisage 'different choices and possibilities and to imagine and to think "otherwise"' (Andreotti, 2010, p. 9). In questioning rather than adapting, we do not pre-determine what comes 'after', rather we negotiate and renegotiate our conceptualisations, using the multiple perspectives available in diverse, global societies and critically engaging with power relations and hegemonic discourses. The challenge in

teacher education, as Andreotti describes it, is to 'equip educators to make their own informed decisions in relation to the contributions they can make in their contexts in dialogue with colleagues, learners, parents and the wider society' (2010, p. 12).

The concepts of contextual realism and contextual relativism proved a fruitful way of understanding these tensions in relation to my decision making within the course. Table 3 is a representation of the way that I interpreted realism, contextual realism and contextual relativism, in relation to perceptions about learners, the course content, processes and outcomes.

Table 3 Comparison of implications of realism, contextual realism and contextual relativism

	Empiricist realism	Contextual realism	Contextual relativism
Perceptions about learners	<p>Students are 'empty vessels' to be filled with knowledge.</p> <p>Students' job is to engage with new knowledge and reproduce it in their assignments.</p>	<p>Students bring a range of experiences and prior knowledge which must be added to or reshaped with predetermined course content.</p> <p>Students should individually connect with new knowledge to incorporate into their existing frameworks.</p> <p>Students are autonomous thinkers who will come to the right conclusions if new knowledge is introduced in the right way.</p>	<p>Students bring a range of experiences and prior knowledge which provides multiple perspectives on, and starting points for, course content.</p> <p>Students are situated subjects conditioned by the discourses available to them.</p> <p>Providing new/alternative discourses will enhance their epistemic pluralism and ability to think for themselves and choose responsibly what to do.</p>
Course content	<p>Teacher controlled.</p> <p>Focus on authoritative (expert) knowledge.</p> <p>Building conceptual understandings logically and linearly towards predetermined outcomes.</p>	<p>Controlled and negotiated content. Some learner choice.</p> <p>Valuing prior knowledge/experience.</p> <p>Distributed knowledge but hierarchical aspects unquestioned (experts more valued than community).</p>	<p>Controlled and uncontrolled content with a focus on enabling learners to engage with different perspectives.</p> <p>Negotiated content within the context of the course.</p> <p>Placing critical examination of concepts, hierarchies and assumptions at the centre (including prior knowledge and experience).</p>
Pedagogical processes	<p>Knowledge construction through transmission or scaffolding</p> <p>Scaffolding used to enhance student engagement in the construction of known knowledge</p> <p>Do as I say, not as I do.</p>	<p>Knowledge construction via the process of inquiry.</p> <p>Construction of known knowledge, but with consideration of multiple perspectives (but there is a known right answer at the end).</p> <p>Scaffolding of the process to promote engagement with the content.</p>	<p>Knowledge construction via the process of inquiry.</p> <p>Focus on questioning usual hierarchy & valuing different knowledges.</p> <p>Actively developing spaces for different epistemologies to be enacted/taken up and explored.</p> <p>Constant negotiation of the content to support the learning process.</p>
Expected Outcomes	<p>Understanding of diversity & difference that reflects the lecturer's ideas.</p> <p>Knowledge of right strategies and applications.</p> <p>Controlled outcome—application in planning/teaching context.</p>	<p>Engagement with diversity in order to help minorities 'fit in' the school context.</p> <p>Improved individual ability to choose strategies based on expert knowledge, and evidence (and own experiences, beliefs etc).</p> <p>Controlled outcome—application in planning/ teaching context for assessment purposes.</p>	<p>Relativisation of own knowledge (reflexivity) in order to enable epistemological pluralism.</p> <p>Improved analysis of power relations in wider context, ethical drive to challenge epistemic violence (racism).</p> <p>Preparing students for the uncertainty, diversity and complexity of real life contexts: to choose best strategy according to context.</p> <p>Uncontrolled outcome.</p>

Throughout the course, I experienced tensions and paradoxes in the way I used inquiry to build knowledge

about cultural and linguistic diversity in education. The content and pedagogical decisions I made generally reflected contextual realism. The students had only limited choices, and the scenarios did not engage with problematic knowledge about power relations and wider issues of hegemonic discourses related to cultural and linguistic diversity within the education system or society itself. There was no opportunity for the students to develop or enact their solutions to the scenario problems, and therefore they did not have a chance to experience knowledge generation and social action in this context. Without this, it seems unlikely that students' conceptualisations of knowledge would shift in meaningful ways that might lead to shifts in teaching practices. At the end of the inquiry presentations I had some doubts about the effectiveness of this approach to learning in a tertiary context. My journal notes at the time suggest anxiety about the variable depth with which students talked about the concepts they had been reading about and discussing. I felt there was a prevalent discourse that responding to diversity was 'a lot of work for teachers', and therefore not easily incorporated into everyday teaching practices. I also noted tensions between my desire to build deeper understandings of the issues inherent in culturally responsive teaching, and the students' desire for quick-fix solutions.

In my teaching decisions I felt constantly compelled to ensure the student teachers were coming to the 'right' conclusions about difference and diversity. My tendency was to steer the students towards particular materials that I knew would challenge some of the commonly held misconceptions about, and negative attitudes towards, cultural and linguistic difference. I grappled with notions of 'letting go' control of the inquiry when there were clear course outcomes that needed to be met. I was concerned that more student autonomy would lead to absolute relativism (anything goes) which would not serve the purposes of the course. I struggled to reconcile my commitment to learner ownership (which requires a high level of trust in learners) and my own fears that they would deviate too much from the achievement objectives of the course, which would make me responsible for their failures in the classroom. I felt that the stakes were too high to risk students not acquiring important understandings to meet the course outcomes for culturally responsive teaching. This highlights an important difference between the use of inquiry in professional adult learning focusing on the development of specific pre-dispositions, and social inquiry in primary classroom contexts where deviation from curriculum achievement objectives has less significant further implications.

The reflexive process undertaken as part of this project, has enabled me to understand and hence better navigate the tensions I experienced in reconciling my pedagogic decision-making with my ontological beliefs and the shifts occurring in each. It is clear that my shifts are towards contextual relativism that has an emancipatory project and is interested in social justice. Two understandings epitomise this shift. The first is the understanding that there are few (if any) absolute certainties in education and teaching. The second, related, understanding is that all answers are partial and temporary and contextualised. This poses some challenges in that it means that my efforts to maintain an alignment between all parts of my working theories of the world are rendered somewhat pointless. If I accept that aspects of my understandings and beliefs about the world will change, over time and place, then my identity and understandings about the world are always in a state of flux. I have found this disconcerting and have been forced to accept ambiguity and the fact that my teaching will also always be in a process of development and 'becoming' as my understandings change in response to new ideas and perspectives.

Working the spaces between realism and relativism

It became apparent that both I and the student teachers struggled to overcome our desire for certainty and stability, rather than engage with the messiness and paradoxes inherent in education in the twenty-first century. There seems to be an irreconcilable tension between the realist desire for stable 'answers' to pedagogical 'problems', and the relativist instability of any answer. There is also a tendency to dichotomise the choices we have and positions we can take, which tends to shut down the potential for exploring the messiness and uncertainties, but also the productiveness of the learning spaces between realism and relativism.

As the student teachers experienced inquiry-based learning, they needed to engage in more directed and explicit conversations about knowledge and knowing. This may have raised awareness about their personal epistemologies, and prompted shifts towards more relativist conceptualisations aligned with the NZC. I could

also have better contributed to an understanding of the contradictions inherent in teaching if I had been more open about the challenges I experienced in incorporating inquiry-based learning into the course. There was a missed opportunity to demonstrate teaching-as-inquiry in action to the student teachers, which could have enabled a deeper understanding of knowledge generation.

Understanding and working the spaces between realism and relativism is an ongoing process. This process is filled with ambiguity, tension and paradox, reflecting that 'pedagogical change is bound by a complex web of professional and personal discourses' (Skattebol, 2010, p. 84). Nevertheless, the reflexive work of inquiring into my own teaching, and encouraging students to inquire into theirs, has potential benefits in terms of shifts towards epistemological pluralism that I believe are necessary for teaching in the twenty-first century. Treating this process (and the accompanying uncertainty and complexity) as part of the work of a teacher and teacher educator is perhaps one of the more important shifts in understanding that I have experienced in this project: from a state of stable 'being' to a state of constant 'becoming'.

Conclusion

In this case study, I have described the effects of introducing a pedagogical initiative—inquiry-based learning—into a teacher education course. I discussed the student teachers' perceptions and responses to this initiative, and its influence on their developing epistemological understandings. I also considered my own reflexive responses to this initiative. The epistemological and ontological tensions that became apparent can be viewed as problematic or productive, depending on one's perspective. Taking a post-modern view, shaped by notions of space and the important role of context in making pedagogical choices, I suggest that working the spaces between realism and relativism can be productive for negotiating the process of becoming that characterises teaching and learning in the twenty-first century.

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Inquiry-based learning can also benefit teachers, as you can repurpose activities for almost any classroom. Even regardless of grade and individual skill levels. This is because you can

7 Inquiry-Based Learning Strategies and Activities for Teachers.

Like any teaching method, there are strategies to help you successfully run an inquiry activity. These strategies will also allow you and your students to enjoy the full extent of inquiry-based learning's benefits. An inquiry-based learning model often flips the roles of the teacher and student. Students become the researchers, and teachers assume the role of the assistant or guide to their learning (Dobber et al., 2017). One way to encourage this is to flip the classroom itself so that instructional lessons are delivered online, and class time is devoted to students applying what they have learned through practice and collaborative activities.

Helping English learners increase achievement through inquiry-based science instruction.

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Literature review: The role of the teacher in inquiry-based education.

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Inquiry-based learning (also spelled as enquiry-based learning in British English) is a form of active learning that starts by posing questions, problems or scenarios. It contrasts with traditional education, which generally relies on the teacher presenting facts and their own knowledge about the subject. Inquiry-based learning is often assisted by a facilitator rather than a lecturer. Inquirers will identify and research issues and questions to develop knowledge or solutions.

Inquiry-based learning: An approach to educating and inspiring kids.

Inquiry-based learning is not a new technique—in fact, it goes back to education philosopher John Dewey—but it does stand in contrast to the more structured, curriculum-centered framework of today's schools. Asking questions is at the heart of inquiry-based learning.

Inquiry-based learning is one of many terms used to describe educational approaches that are driven more by a learner's questions than by a teacher's lessons.

Practice your questioning and listening skills with exercises like this one: In your next staff meeting, have everyone pair off and ask each other the story of their name. How would you ask that question? The way you do it will play a role in determining the answer you get. Inquiry-based teaching inspires students to learn more, and to learn more thoroughly. Middle-school physics students taught through inquiry outperformed high school students taught with conventional methods. Three middle school science teachers in urban public schools taught fundamental concepts of physics by using a computer-based inquiry curriculum. Instead of emphasizing facts and details, the curriculum engaged students in authentic scientific investigations that asked students to create and apply models of force and motion. The curriculum also challenged students to inquire into their own