Teacher-as-*bricoleur*: Implications for teacher education

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Abstract

This paper discusses how teacher education programs can provide pre-service teachers with the skills to capitalise on spontaneous opportunities that arise during classroom teaching to promote student creativity. Creativity is believed to be a key part of the nature of science and as such nurturing creative thinking is central to secondary science education. Yet studies repeatedly show the science education provided to secondary school students is more akin to the deficit model, typically utilising transmissionist pedagogies. This study found a teacher-as-*bricoleur* approach enabled secondary science teachers to respond to serendipitous and spontaneous events that occurred when teaching in a way that enhanced learning and promoted opportunities for creative thinking by the students. The research was essentially a case study that employed the analysis techniques of grounded theory and drew from phenomenology the focus on the phenomenon. Data were collected from ten secondary science teachers and the essence of how these teachers nurtured and promoted student creative thinking was distilled using the techniques of constant comparison and reflexivity. Pedagogies that capitalised on spontaneous and serendipitous opportunities to promote creative thinking involved not following a set way or step-by-step process. The study also highlighted that opportunities for students to think creatively depended on the teacher. Effective teacher education programs will need to focus on equipping pre-service teachers with the skills to recognise opportunities to engage students in creative thinking, and then adapt the intended lesson to capitalise on the opportunity.

Introduction

Research has consistently linked teacher quality to student achievement (Hattie, 2003). There is also evidence that the quality of teacher education provided to pre-service teacher education students impacts student achievement (Darling-Hammond, 1999). University teacher education programs in Australia must meet the National Professional Standards for Graduate Teachers (Australian Institute for Teaching and School Leadership (AITSL), 2011). The initial study this paper draws from investigated how to teach for creativity in secondary school science; however, the study findings had implications for teacher education. Science education research has revealed that school science had remained relatively unchanged for the last half-century (Tytler, 2007). The resilience of school science to change is remarkable given the rapid changes in science and technology. Yet, perhaps it is not surprising considering that occupational socialization of teachers is reputed to start before prospective teachers enter teacher education, continue through pre-service teacher education and restart when the novice teacher enters the workplace (Allen, 2006). The traditional model of the teacher as expert has been undermined by the speed at which young people can now access information (Tytler, 2007). A different model of teacher is called for, the teacher-as-*bricoleur*.

The teacher-as-*bricoleur* is a pedagogical bricoleur who uses whatever events or artefacts are available to progress student thinking. They can respond to unplanned yet serendipitous opportunities to further student creative thinking. This paper contributes to the body of knowledge

aimed at enhancing pre-service teacher education by proposing a new understanding, teacher pedagogical creativity augmented through a teacher-as-*bricoleur* stance. The study found that experienced science teachers had a pedagogical creativity that was enacted through a teacher-as-*bricoleur* stance. This finding of a teacher pedagogical creativity and its enactment through a teacher-as-*bricoleur* stance has implications for teacher education and the way that pre-service teachers are taught to conceptualise planning and implementation of learning experiences.

The paper commences with an overview of the doctoral research from which the findings of a teacher pedagogical creativity and teacher-as-*bricoleur* emerged. Next a snapshot of the methodology of the research is presented to contextualise the way in which data were collected, analysed and interpreted. From here the paper relays a story about two characters, one an experienced science teacher and the other a novice teacher. Their views on teaching for creativity and the inherent challenges are juxtaposed throughout the story. The final section examines the implications of the findings for teacher education providers.

Overview

The doctoral research involved an investigation into creativity in science in the secondary years of schooling. A specific research aim was to identify pedagogical strategies that promoted opportunities for secondary school students to engage in creativity in science. Teaching for creativity requires teacher actions that focus on developing student creative capacity through engagement in creative thinking (NACCCE, 1999).

The *Australian Curriculum* (Australian Curriculum, Assessment and Reporting Authority (ACARA), 2012) includes creativity as one of seven general capabilities considered essential for students to live and work in the twenty-first century (ACARA, 2012). Creative thinking is broadly outlined in the *Australian Curriculum* as thinking that:

> … involves students in learning to generate and apply new ideas in specific contexts, seeing existing situations in a new way, identifying alternative explanations, and seeing or making new links that generate a positive outcome … combining parts to form something original, sifting and refining ideas to discover possibilities, constructing theories and objects, and acting on intuition (ACARA, 2012, p. 13).

A more detailed statement on creativity is provided in the *Australian Curriculum: Science* (ACARA, 2012):

> In the Science learning area, critical and creative thinking are embedded in the skills of posing questions, making predictions, speculating, solving problems through investigation, making evidence-based decisions, and analysing and evaluating evidence.

Clearly, creativity is expected to play a part in science education. Science teachers, and teachers of other discipline areas, are tasked with constructing a classroom environment supportive of creativity. How a creativity-friendly learning environment is developed, how to teach for creativity and the pedagogies that support such teaching are not well documented in secondary science education (Cheng, 2004). In part, this can be attributed to lack of clarity concerning the construct of creativity and the plethora of definitions in the literature (Best & Thomas, 2007). The United Kingdom National Advisory Committee on Creativity and Cultural Education (NACCCE, 1999) defined creativity as an “imaginative activity fashioned so as to produce outcomes that are both original and of value” (p. 30). Exponents of creativity, such as Craft (2005) and Sawyer (2006) hold that the creative process uses the same mental processes as everyday thinking, the difference comes from the amount of time spent thinking, the number of ideas that are generated from the thinking, and the

juxtaposition of ideas and knowledge from distantly related parts of the brain to form new ways of thinking about things.

The importance of creativity to the work of scientists and science education is not new. As early as 1998, McComas and Olson's investigation of national curricula and national standards documents for science education identified a consistent theme, that of 'scientists are creative'. Indeed, creativity was identified as one of 11 key themes about the nature of science that should be taught in schools. Lending further support to the importance of creativity in the school curricula in general was the claim by Starko (1995) that, "without creativity we have no art, no literature, no science, no innovation, no problem solving, no progress" (p. vii). Given Starko's bold statement, the declining numbers of students choosing science subjects in the senior secondary school years, the shortage of science teachers worldwide (Tytler, 2007), and the new Australian National Curriculum for Science, research aimed at explicating pedagogical approaches to nurturing student creativity in secondary school science appeared imperative. The doctoral thesis established that a teacher-as-*bricoleur* stance was a legitimate approach to teaching for creativity that enabled the secondary science teachers to capitalize on serendipitous opportunities for creativity throughout science lessons.

Methodology of the research

The research was conducted in a regional secondary school in Queensland and involved secondary school science teachers. A qualitative interpretive paradigm was adopted and a blended approach, grounded phenomenological case study, was utilised to elucidate how to teach for creativity in secondary school science. Teachers' perceptions of how to teach for creativity were gathered using observation, semi-structured interviews and artefacts, and analysed using the techniques of coding and reflexive iteration to arrive at themes. An interpretive qualitative approach focused on socially constructed meaning was chosen, as the interpretative paradigm assumes theory is emergent and 'grounded' in the data (Glaser & Strauss, 1967). The study was premised on the assumption that multiple constructions and interpretations of reality are possible (Merriam, 2009). The study focused on Data interpretation focused on constructing an understanding of the phenomenon of creativity in secondary school science by attending to participants voice about the phenomenon (Merriam, 2009).

Introducing Shannon and Chris

The discordance between planning for teaching and the actual implementation of teaching episodes is often problematic for pre-service and novice teachers. Hours of meticulous planning can be put in jeopardy by an unexpected incident in the classroom and novice teachers struggle to cope with the potential change to their intended lesson, often opting instead to continue dogmatically with the planned learning experiences. In contrast, experienced teachers appear to capitalise on the unexpected, often diverge from the planned lesson, and *follow a whim*. This section looks at the challenges to teaching for creativity from the perspectives of two secondary school science teachers, Shannon and Chris. Shannon is in her first year of teaching and Chris has over thirty years of classroom teaching experience. Shannon and Chris's words are in italics in the paragraphs that follow.

For Chris *part of creativity is actually having fun.* Chris felt that the *only way to teach science is creatively, because without doing really exciting, interesting things; you might as well forget it*. Chris maintained that teachers

> *... should be teaching creativity because it is part of a life skill, problem solving. Kids needed to problem-solve themselves rather than the teacher spouting all the directions.*

> *The students need to identify the issues and responsibilities and work through the instructions themselves. You can't just tell the kids to go out and be creative without giving them the strategies and the opportunities to both develop and show what they can do*.

Chris was adamant that the teacher had a responsibility to structure science lessons so that students could *be creative in a well thought out framework … that allows them to develop robust understandings and foundations that allow for them to go further*. Yet, Chris divulged that *being able to wing it … work with your kids* and engage in spontaneous discussions as they emerged was a critical element to furthering creative thinking. *Spontaneous discussions can generate rich and creative learning experiences* and as a teacher striving for student creativity you had *to have faith in the mess.* Chris took advantage of serendipitous opportunities and spontaneous student discussions that arose to further creative thinking.

Still, discussions of this type were not left to chance and Chris told how *you plant the seed* for such discussions. In an introductory lesson on ecology, Chris showed clips from *the Lion King and Madagascar where Alex is walking along with the nice music, and then the crocodile eat…* Chris uses *this to get the kids to think about how it made them feel? What impression did it leave about the way organisms coexist?* Chris planned for the spontaneous, and deliberately structured learning so that opportunities for discussions that would further creative thinking arose. For Chris creativity required teachers to *plan exciting and interesting activities that made students think differently about things* but also be able *to go off on a tangent with the kids.* Chris believed that teachers needed to be *encouraged to step a little outside their comfort zone* and that *teaching creatively needs teachers to be stimulated and encouraged to risk-take.* Chris put it quite bluntly stating, *if you want creativity you have to encourage the teachers to do what they're asking the kids to do, take the risks, and try new stuff.*

Shannon preferred to *play it safe* with pedagogy choices for lessons as *it was a big staffroom with a lot of people, and things are set the way they are*. Shannon was concerned about students doing well on assessment tasks and *making sure that you get through everything before the exam*. In contrast to Chris, Shannon was wary of students having too much fun because *if you're doing things that are creative and fun all the time, the students are "Oh… so fun, we do nothing in science". So they don't think they are learning.* Shannon was *not sure about specific teaching strategies for creativity*, but admired the way Chris *made students think*…Chris *doesn't give them much… makes them go get it themselves.* When comparing their teaching styles Shannon commented that, *I think I do too much for them sometimes and I'm stumping them in how much they have to think*. Shannon was not sure how Chris orchestrated student thinking, but recognized students were thinking and figuring out solutions to their questions and problems seemingly independently of Chris.

Chris demonstrates how experienced teachers manufacture opportunities for creative thinking and are opportunistic when teaching with regards to progressing creativity. Chris adopts a teacher-as-*bricoleur* stance, seizing opportunities as they present to further student creativity. Creating opportunities and being opportunistic with regard to student creative thinking emerged as critical essences of a pedagogical approach aimed at nurturing student creativity in secondary school science. Experienced teachers, such as Chris, are able to draw on their pedagogical creativity and a bricoleur stance to enact creativity-centred science lessons in secondary school science education.

Opportunities for creative thinking do not always occur incidentally, teachers deliberately plan for such opportunities. The paradox is that whilst the teacher must systematically plan for creative thinking opportunities, creativity cannot be routinized. Its nature and integrity are based on difference and spontaneity. The moment creativity is confined to a formula or one-way of doing, it is no longer creative. This presents a dilemma for teachers striving to build creative capacity and a challenge to teacher education programs endeavouring to graduate workplace ready teachers. Whilst there is no one-way of teaching for creativity, creating and recognising opportunities for

nurturing student creativity is fundamental. By adopting a teacher-as-*bricoleur* stance Chris could respond to seemingly spontaneous and serendipitous opportunities to further student creative thinking that arose when teaching secondary school science. As an experienced teacher, Chris instantly recognised opportunities to further creative thinking and acted on them. In contrast, Shannon recognised opportunities but was hesitant to act on them and stray from the norm.

Implications for teacher education

Experienced teachers plan for specific learning episodes. Yet, when unexpected or unplanned situations arise during the lesson, they not only cope with the change, they also recognise any inherent opportunities to extend student thinking, and act to further the learning. Experience, and experiences, enables these teachers to capitalise on spontaneous events arising during classroom teaching to further student thinking. Van Manen (1996) argued that "to be fit for teaching is to be able to handle change" (p. 29). If pre-service teachers are to be workplace ready they too need to be able to recognise and respond to serendipitous opportunities to extend student thinking and importantly student creativity. Learning how to adopt a *bricoleur* stance to teaching may well help pre-service teachers reconcile the discordance between the intended and actual learning implemented as it shifts a divergence from the intended lesson plan from *following a whim* to a strategic and intentional response to an opportunity to further student thinking and creativity.

The teacher-as-*bricoleur* finding aligns with Fritz's (1991) construction of creativity as a set of binaries "both predictable and unpredictable … composition and improvisation … intuitive and … rational" (p. 80). Importantly, from a teacher education perspective, Fritz argued that, "the creative process was learnable" (p. 8). The teacher-as-*bricoleur* has the capability to react pedagogically to unpredictable events that occur during teaching and improvise. This ability to act as a bricoleur appears to be intuitive for experienced teachers. Yet, if Sawyer's (2006) contention about seemingly sudden insights and intuitive leaps is correct, then the teachers' brain has actually been working subconsciously on how to capitalize on these spontaneous opportunities to progress student creative thinking all along.

For teachers to recognise and act on creative thinking opportunities they need to understand the construct of creativity (Forster, 1998). Designing lessons that provide creative thinking opportunities necessitates an intimate knowledge of the creative process. The art of teaching for creativity is concerned with teacher decision-making in response to student actions. The science of teaching for creativity involves astute and perceptive planning to make the seemingly spontaneous arise. Teaching for creativity involves intuition, judgement, and a bricoleur approach to extract maximum benefit when serendipitous opportunities arise. While teaching for creativity cannot be routinized and pre-service teachers cannot be taught "didactically how to be creative (Craft, 2001, p. 21), the ability to make intuitive decisions, to enact a teacher-as-*bricoleur* stance when in the midst of teaching can be honed and this is the province of teacher education.

Conclusion

The research findings are significant to pre-service teacher education providers charged with the responsibility of producing the next generation of science teachers. The findings suggest that teacher pedagogical creativity is used to design opportunities for creative thinking that are then enacted through a bricoleur stance to realise creative thinking opportunities for students in secondary school science. Empirical support for the finding of a teacher-as-*bricoleur* approach comes from Chris *being able to wing it … work with your kids* and engage in spontaneous discussions. This emerged as a critical element to furthering creative thinking as *spontaneous discussions can generate rich and creative learning experiences*. Chris took advantage of

serendipitous opportunities and spontaneous discussions to further creative thinking and had *faith in the mess*. Discussions of this type were not left to chance; Chris planned for the spontaneous, and deliberately structured learning so that serendipitous opportunities for discussions furthering creativity transpired. Recognition of a pedagogical creativity and understanding of a bricoleur stance have significant implications for teacher education and the way pre-service teachers are taught to plan and implement teaching episodes.

Fensham (2004) maintained that the key to reform and redesign of the science curriculum was to establish the educational purpose. If the purpose is to prepare future scientists, then studies of the way scientists work suggest creativity should be a prominent part. If the purpose is to engage students in science issues that have personal and social relevance, then creativity is again an important quality in enabling students to engage in what Fensham referred to as “creative problem solving” (p. 9). Perhaps the key to reform and redesign of teacher education is a focus on the educational purpose. Is the purpose to prepare pre-service teachers for work as a teacher, or is it also about preparing them to engage in educational issues that have personal and social relevance. If so, then the capacity to engage in “creative problem solving” (Fensham, 2004, p.9) is equally important for teachers and may well equip pre-service teachers with the skills to be change agents in schools. Occupational socialization is undoubtedly a strong force on novice teachers and creative solutions and creative teachers are required for a change in the status quo.

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