Immersion within 360 video settings: Capitalising on embodied perspectives to develop reflection-in-action within pre-service teacher education

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Teacher education needs to respond to the challenge of developing teachers who can think on their feet and make responsive changes to their instructional practice in the moment. New applications of technology such as manipulable, 360-degree video can afford beginning teachers with the opportunity to explicitly develop critical skills needed to reflect-in-action. Allowing pre-service teachers to reflectively examine classroom scenarios from a situated perspective has the potential for them to increase their ability to ‘notice’ aspects of practice that have particular significance in educational settings and inform their professional responses. This immersion in the dynamic evolving context can also provide pre-service teachers the opportunity to ‘read’ the environment, examine their own immediate responses to classroom situations and learn to exercise metacognitive control over their own responses in context. Thus it can enable them to develop a sense of body awareness that complements the more intentional and cognitive aspects of reflection typically by a teacher in a real classroom setting. This paper argues for teacher education programs to draw on technologies that making tacit knowledge explicit and to inform and openly address perceptual and embodied aspects of professional vision. It proposes that these elements are central to the production of emotionally resilient, work-ready teachers. The paper also highlights the comparative advantages of 360-degree video over similar technologies such as virtual reality in prompting context-specific subtleties such as facial expressions to enable reflect in action.

Keywords: Embodied reflection, 360-degree video, pre-service teacher education

Introduction

Teacher education largely relies on reflection as the bridge that addresses the gap between theory and practice (Atkinson, 2012; Mena Marcos, Sánchez, & Tillema, 2008; Postholm, 2008). Using theoretical constructs to interpret available sensory information and make appropriate changes to their behaviour in dynamically responsive ways in real time within classroom contexts is often out of reach for beginning teachers (Jaeger, 2013).

The lack of clarity in modelling effective reflection processes provided within teacher education contexts have led to little impact on pre-service teacher practice (Beauchamp, 2015). This position paper focuses on how preservice
teachers may be sensitised to the metacognitive challenges of real-time reflection by identifying one possible path to realise the potential of situated decision-making within complex classroom environments and to facilitate the process of reflection in action (Schon; 1987). I argue that immersive approaches are a critical and facilitative step in this transition by drawing on the concept of embodiment.

Immersive, 360-degree video provides an intermediary to real-life classroom settings that can prime pre-service teachers’ on how to deal with the immediacy of the context. The immersive nature of the video facilitates an analogue connection with the complexity of the context while enabling the potential to sustain the metacognitive distance for professional vision (Goodwin, 1994) when needed. The situated and embodied experience that results from immersion offers pre-service teachers the potential to hone the observational skills required to increase awareness of the causal link between the multiple cues that influences practice in the moment.

Teacher reflection as a construct

Over the past 25 years, there has been little consensus over what constitutes “reflection” (Beauchamp, 2006; 2015; Collin, Karsenti, & Komis, 2013; Galea, 2012; Thompson & Pascal, 2012). The large number of disparate terms used to refer to this phenomenon such as ‘reflexivity’, ‘reflection’, and ‘reflective analysis’ to refer to the phenomenon have added to the confusion in defining the term (Collin et al, 2013). What constitutes reflection can be found between competing views of disciplined and rational inquiry (Dewey, 1933), the more practice-based view of intuitive and dynamic responsive reflection in action (Schön, 1987), and the role of emotional aspects within such approaches (Moon, 1999).

Due to this lack of consistency, for the purposes of this paper, I adopt Colin et. al.’s (2013) practical and operational definition, both, to address the varied interpretations, as well as to highlight the multi-faceted nature of the construct. Following Collin et. al. (2013), I recognise reflection as:

[A] process (examining, thinking and understanding, problem solving, analyzing, evaluating and/or constructing, developing and transforming) concerning a particular object (practice, social knowledge, experience, information, theories, meaning, beliefs, self and/or issues of concern) and in view of achieving a particular goal, or rationale (think differently or more clearly, justify one’s stance, think about actions or decisions, change thinking or knowledge, take or improve action, improve student learning, alter self or society) (p. 106).

That is to say that teachers engage in many different mental processes to target specific aspects of teacher practice in a goal driven way and to inform their actions.
The multiple mental processes in which teachers engage could include thinking about a particular student’s progress, problem-solving what productive supports are needed in place for such students, or anticipating how such support mechanisms could be offered to help a student learn effectively. Reflection may also focus on a number of aspects related to practice including student learning, how teachers may respond to the student or even the social context within which learning takes place. Alternatively, teacher reflection could also target management of classroom behaviour, modification of their own response to help the student engage better and a range of other issues related to teaching and learning.

Despite the myriad interpretations and the multiple ways in which reflection is realised, there is implicit consensus that reflection is a process that is anticipatory and imaginative, in seeking solutions to problems (Postholm, 2008; Ottesen, 2007; Urzá & Vásquez, 2008; and Wilson, 2008) that are contextually situated (Collin et al, 2013).

In general, teacher reflection at increasing levels of sophistication is a requirement for teacher certification and career advancement in the Australian system (Australian Institute for Teaching and School Leadership, 2013). This need for reflection in relation to one’s practice is evident within Standard 6 of the Australian Professional Standards for Teachers (AITSL, 2011). Although this standard targets teacher response and ability to prompt effective student learning, the wider implication for teacher professional learning is evident in its overarching effect on all areas of teachers’ work. Reflection also impacts a teacher’s ability identified by all the other standards; one’s knowledge of learners and their learning, teaching strategies and contextual factors as well as professional learning and engagement (AITSL, 2011).

Reflection is thus, considered a key generic competency within most teacher education programs and is developed in the professional practice components of most pre-service programs (Collin et. al., 2013). However, graduates are often unable to determine the role reflection has to play within their career development resulting in an inability to recognize the importance of developing reflective practice. Consequently, approaches to teaching how to reflect have not always had the desired impact on pre-service teacher professional growth (Collin et. al., 2013).

**Approaches to developing reflection**

Approaches used within pre-service teacher education to promote reflection, are distributed across a continuum of detailed steps through to more extended phase-based approaches. Some of these adopt a methodically precise series of steps—some as specific as Bain’s 4R model (Bain, Ballantayne, Mills & Lester, 2002)—while others facilitate the reflective process through more general orientations and approaches without detailing exactly how the reflective process is to be enacted (Hatton & Smith, 1994; Zeichner, 1987). Although most approaches appeal to rational thought some concede that the intuitive is an integral aspect of reflection (Moon, 1999).
More importantly, most approaches do not identify whether reflective skills learnt in the pre-service setting is translated into contexts of practice. Beauchamp (2006; 2015) maintains that the problem could be a result of pre-service teachers being taught what reflection is with a focus on concepts such as reflection-on-action (Dewey, 1933) and reflection-in-action (Schön, 1987) without being taught how to reflect.

Even when reflection is considered a technical and instrumental process, pre-service teachers are invariably affected by biophysical influences (Kinsella, 2007; 2010), personal histories and shaped by the socially meaningful dynamic contexts and processes in which it arises (Maturana & Varela, 1987). Consequently, although sociological approaches have been recommended for understanding the complex influences of physical, social and psychological aspects of reflection (Thompson & Thompson, 2008; Thompson & Pascal, 2012), there is need for the embedded and embodied, multi-dimensional aspects of reflection to be facilitated in holistic ways (Kinsella, 2007; Moore-Russo & Wilsey, 2014; Thompson & Pascal, 2012).

Reconceptualisation of reflection as a multi-dimensional process demands that productive reflection address content (the object of reflection), connectedness (maintaining focus on the object in reflection) and complexity (being able to identify the complex relations that impinge on possible solutions) (Moore-Russo & Wilsey, 2014). The ability to keep focus and reflect on any specific aspect in the emergent classroom dynamic requires an awareness that is sensitive to one’s vantage point. For reflection to be productive teachers also need to consider the complex interactions within which they are situated, which impinges on their ability to act on their reflections.

Reflection is a dynamic process that is embodied at the level of the biophysical through perception. It is also socially mediated when teachers act on reflection shaping the emergent context in ecological ways (Davis, Sumara and Luce-Kapler; Maturana and Varela, 1987; Varela, Thompson & Rosch, 1991). An emphasis on the role of the body within the reflective process requires that pre-service teachers develop a deep understanding of how the body may influence content, connectedness and complexity (Russo-Moore & Wilesy, 2014) when they act on reflections within the social and emergent ecologies. Such a position requires that pre-service reflection extend beyond the technical-rational. Therefore, an approach that scaffolds productive reflection needs to account for the embodied aspect of situated reflection while accounting for teachers’ ability to notice salient aspects of the emerging dynamic context.

The role of the body

Typical approaches to reflection within pre-service courses often fail to highlight the multimodal and situated nature of reflection (Beauchamp, 2006; Jaeger, 2013; Moon, 2004). Many practical approaches to facilitate reflection (such as the use of Bain and Ballantyne’s (2002) 4R Model, Gibb’s (1988) Model or Kolb’s (1984) Reflective Cycle) often do not take into
account the multimodality of expression through which reflection occurs.

The literature on pre-service teacher reflection reveals an inability for graduates to translate reflective thought into action (Beauchamp, 2006; 2015; Jaeger, 2013). This inability to enact reflection can be conceptualised as a result of the deep separation between the body and mind that is present in conventional approaches to reflective practice (Kinsella, 2007). These models do not offer the deep understanding of reflection as “performative expression [that] allows for personal transformation through acute awareness of, and reflection on, one’s own beliefs, knowledge and values” (Barton & Ryan, 2014, p. 412, emphasis mine).

The recognition that reflection arises from action and in contextual response to it, situates reflection back in the realm of experience, bringing forth with it a need for addressing the felt and tacit aspects of teacher reflection (Polyani, 1976). The deeply embodied (Kinsella, 2010) and perspective-based nature of reflection allow us to “see and read [our situated] enfleshment to sharpen focus on embodied pedagogy or the relational givenness” (Dixon & Senior, 2011) within the act of teaching.

In short, a functionally viable, process-based approach to reflection demands the understanding that “human cognition is deeply rooted in the body’s interaction with its physical environment” (Lindgren & Johnson-Glenberg, 2013, p. 446). The meanings we are able to make with and about the world are dependent on the “kinds of experiences that come from having a body with various [and specific] sensorimotor capacities” (Varela, Thompson & Rosh, 1991, p. 173). Such a position brings the enacted body into relief in ways that underpin cognitive activities including reflection as “depend[ing] crucially on our bodies, especially our sensorimotor apparatus, which enables us to perceive, move, and manipulate” (Lakoff & Johnson, 1999, p. 17) our world.

Teacher reflection, when considered a situated, body-dependent process therefore, has the potential to draw from the tacit elements of cognition evident in what Argyris and Schon call theories-in-use (1992). Theories of embodied cognition (Lakoff & Johnson, 1999) also suggest new ways to look at how we process information. They indicate that the way bodies experience space/place and time qualitatively reconstitute our understanding of the world. Embodiment based theories also focus on how the ability to access our reflections is simultaneously shaped by unconscious thought and impacted by the perceptual idiosyncracies that are unique to the bodies we inhabit (Lakoff & Johnson, 1999). In regulating our emotions and perceptions within contexts through bodily perceptions, the implicit reflective engagement that lies beneath the explicit reflective processes that teachers use become apparent, mandating a more nuanced approach to promoting reflection.
Extending the domain of Professional Vision.

Recent developments on reflection emphasise the role of visual perception to inform reflection. Van Es and Sherin (2002) argue that in order for teaching to be reflective and adaptive, teachers need to develop the skills of noticing and to be able to recognise aspects of pedagogical salience within complex teaching environments. This Professional Vision (Goodwin, 1994) is constructed through selective perceptual attention and informed by disciplinary knowledge-based reasoning (Sherin, 2007).

Seidel and Sturmer (2014) propose that the two elements of professional vision require further clarification. They propose that noticing is informed by anticipating what the teacher hopes to achieve (goal clarity), the responsive actions of the teacher (teacher support), and a reading of the learning context (learning climate). I propose that a focus on the bodily nature of perception is needed to root perception and emphasise how the noticing can be impacted by bodily movement (see fig 1). The model proposed by Seidel and Sturmer (2014) also suggests that effective knowledge-based reasoning informs the reflective process through professional vision with its explanatory power to inform the deconstruction of classroom events and outline the consequences of such an explanation to predict potential outcomes of such reasoning.

From a constructivist position our experiences as students or teachers (Piaget, 1990; Vygotsky 1978) and our embodied navigation of space and time in classroom settings impact the very meanings and language we construct (Lakoff & Johnson, 1999). How our body memory is built into our neural structures and constrain the descriptive, explanatory and predictive potential we hold (Maturana & Varela, 1987). In addition, reflection, even of the rational and deductively scientific form is constantly being re-framed in light of the emergent perceptual histories we experience and informed through our perceptual awareness of our bodies in context (Barton & Ryan, 2014) in space and time. The descriptive, explanatory and predictive, processes underpinning professional vision is tacitly rewritten in relational terms due to ones situatedness within the dynamic context. For this reason, I propose that the model of professional vision that informs reflection be modified (see fig. 1) to include the perspectivised nature of noticing and the experiential relations of body-based perceptions that contour our disciplinary knowledge.

For example, a teacher in a classroom is aware of the front, the back and specific locations within the room, the proximity of particular students and how they are located within the environment. Furthermore, the pace at which their context evolves such as the emergence and escalation of disruptive behaviour within the classroom varies in pace. The perceptual perspective that they inhabit as a result of how they are located and inhabit within this dynamic in space and time (Lindgren, 2012) influences presents itself to them. Therefore a form of reflection that targets improved practice must embed the reflection in the messiness of the context in both space and time and in relation to ones location within it.
For this reason, I propose that contexts that provide a realistic experience of being immersed in classrooms may be the site for developing reflection that can reunite thinking with acting (Kinsella, 2007). Such context can enable pre-service teachers to explore “an epistemology of practice implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict” (Schön, 1983, p. 49).

**Immersive contexts and the possibilities they provide**

Much of reflective practice within pre-service education uses text-based approaches or the use of regular, non-immersive video-based reflection (Collin et al. 2013, Jaeger, 2013; Van Es & Sherin, 2006). These approaches do not provide the spatial and temporal situatedness required to help pre-service teachers to draw on their body-based reflective capabilities in the moment. However, virtual reality opportunities (Jaeger, 2013) and 360 degree video contexts offer increasingly embodied ways to engage with reflection.

Immersive 360 degree video offers a unique, interactive, insider perspective to examine contexts that were previously unavailable for use in supporting teacher professional learning and reflection. The video recording captures the setting in all directions. Importantly, the fact that the video is captured from a single position invokes a bodily sense of ‘being there’. Further, it offers the capability to interact with the recorded video through controls that allow the user to pan around and look around in any direction within the captured context at any one time.

The way in which the video is viewed can also add to this feeling of embodied presence and develop a pre-service teachers’ awareness of how they may feel if placed in a similar context. The captured video can be viewed indifferent ways at many levels of immersion (see Figure 2).
The first option is for pre-service teachers to be exposed to view the 360 degree video through a computer-based 360 manipulable video-player. Such players allow users to view the video within a rectangular framed screen, but with the ability to pan around in 360 degrees and to zoom in, in any one direction. This view affords the perspective of embodiment that mirrors being able to look around, but does not provide a full-bodied sense of being within a classroom.

The second option is to view the 360-video on a half-sphere iDome (Figure 2b) which fills the user’s field of view, including the peripheral vision, thus removing the ‘frame’ of the rectangular screen and providing a sense of depth and of actually being ‘within’ the scene. The ability to manipulate the video to ‘look’ around a space where the field of vision is completely filled with the video scenario produces an authentic, embodied response as if you were present in the scene. However, even with the iDome visualization the manipulation of the video is limited to a joystick-type control to move the viewable field of view across the half sphere of the iDome, with the user seated or standing in one spot. As a consequence, the intuitive visual feedback loop that changes one’s field of vision when the head is moved is not achieved. One could argue that a perceptually embedded, fully embodied environment with the capability to develop an intuitively relational repertoire of reflective skills, requires a much more immersive environment; one that responds to one’s perspective and bodily movements such as a turn of the head.

Virtual reality head sets such as Occulus Rift or the Samsung Gear VR (Fig 2) allow a much more immersed view and greater degrees of freedom in movement, engaging reflective possibilities in intuitive ways. The ability to move one’s head to look around in a 360 degree environment without having to manipulate and turn the video around is a key advantage over the iDome perspective. The use of such head sets serves two main purposes; it prompts a much more relatable sense of presence as the field of vision changes when the head is moved and it also creates a fully immersive first-person...
perspective that is prompts an almost visceral response. The interactive affordance that immersion through head mounted visualization options such as the use of virtual reality glasses has been explored within simulated environments with avatar representations (Mikropoulos & Natsis, 2010), and largely to facilitate learning with school aged children. However, such artificial environments and avatar representations have the capability to desensitise human emotions (Weger & Loughnan, 2014) and reduce complexity (Moore-Russo & Wilsey, 2014). That is to say that the relative “robotic, automaton-like behavior” or artificial nature of the constructed environments affects our ability to react with the full range of emotionally informed responses (Haslam, 2006; Moon, 1999) of which we are capable.

In view of the above arguments, that focus on the issue of embodiment, available opportunities for developing pre-service teachers’ ability to reflect must address the multi-faceted nature of reflection. Immersive 360-degree video has a significant role to play in developing embodied reflection at the pre-service and potentially the inservice areas. This is the focus of current research at Edith Cowan University, the subtleties of which will be discussed in upcoming publications.

Inviting teachers to engage in embodied approaches within contexts of low risk to enhance their ability to reflect productively is now possible. The use of 360-degree video for reflection within computer based options, iDome visualisations or Occulus Rift-type viewers has enabled a significant opportunity to examine and explore embodied reflection.

Areas for potential research

We now have the problem of how to optimise the different immersive visualisation opportunities to maximise the potential of 360-degree video in facilitating reflection. What relative affordances does a highly realistic 360 video environment offer? How does a realistic video based environment compare to the more artificial avatar-based virtual reality environments that can offer opportunities to respond reflectively? What specific kinds of opportunities do they each provide for developing teacher reflection? What are some of the ways in which such opportunities can be operationalized within pre-service teacher education to maximise benefits in learning how to reflect in and on practice? These are some immediate implications of considering immersive video as a possible location for promoting pre-service teachers to engage in embodied reflection. Evidence from such research will need to inform justifiable interventions within pre-service teacher education.

Conclusion

In this paper I have argued for the need to perceptually engage pre-service teachers with realistic classroom environments to help them draw on spatial and temporal aspects of reflection. A case has been made for the perceptual immersion of preservice teachers in high fidelity environments as a starting point to invoke embodied, relational reflection through sensitizing perspective-based professional vision situated in space and time which can
help develop a readiness to act. Conceptually, the idea that an approach to teacher education which draws on the tacit aspects of embodied cognition and the feel of being embedded within a classroom have definite potential to support pre-service teachers in metacognitively developing their situated professional vision and reflective capabilities. This visuospatial relational approach to reflection includes some key features that can help new teachers translate their reflection from pre-service teacher education to real life contexts. What is required to realise this potential is the development of the necessary research to establish how such complex components might interact to impact the growth of pre-service teacher expertise in relation to reflection.

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