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Consuming and creating: Early-adopting science teachers' perceptions and use of a wiki to support professional development

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ABSTRACT

Many teachers have little opportunity to share and discuss their practice in the course of a normal school day beyond chance meetings in the staff room. Such a lack of opportunity can leave many teachers feeling isolated. However, online resources are continuously providing teachers with greater opportunities to engage with other teachers. This research studied early-adopting New Zealand science teachers' perceptions and integration of one such online resource, a wiki, for professional development. The wiki was developed to support teacher portfolios consisting of mediums called Content Representations (CoRes) and Pedagogical and Professional-experience Repertoires (PaP-eRs). Initial interviews were conducted with six teachers and were followed by case studies of three of these teachers. Data included pre/post interviews, field notes from feedback on observations, and teachers' use of the wiki. Findings discuss important factors organised around three themes in relation to teacher perceptions and engagement in knowledge sharing on a wiki: technology competence, technology utility, and technology resourcing.

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1. Introduction

One of the most salient issues for practising teachers is isolation. Teachers can be the "kings or queens in their classrooms" (Wubbels, 2007, p.227), but may have very little opportunity to exchange ideas with other teachers. This isolation means that they may be completely unaware of what other teachers are doing (Carroll et al., 2003) both in their own and in other schools. The industrial style model of schools (Attwell, 2007) tends to keep teachers separated from each other during a normal school day. As a result, most day-to-day teacher collaboration occurs during staff room conversations. Such interactions can be dismissed as "water cooler talk" (Sheehy, 2008), but it is in these interactions that many teachers may express a genuine and sincere interest in wanting or needing to learn something new (Santo, 2005), without fear of repercussions and with a level of privacy to what they share (Carroll et al., 2003). It is this "just in time" learning (Granger, Morbey, Lotherington, Owston, & Wideman, 2002, p.483) that can be the preferred form of knowledge acquisition outside of the classroom for many teachers.

Despite professional development opportunities for teachers external to schools, Schlager and Fusco (2003) contend that professional development in the context of practice is much more effective. Gudmundsdottir (1995) also argues that Pedagogical Content Knowledge (PCK) (Shulman, 1986) is largely developed on the job. Therefore, professional development that solely focuses on technical skills and instrumental strategies (Robertson, 2008) is unlikely to lead to sustained change. For sustained change professional development needs to promote teacher dialogue so that teachers continually "subject their theories to review and revision" (Marland, 1998, p.18).

The promotion of teacher dialogue is a difficult challenge for reasons noted already, but it is further complicated by teachers who still perceive teaching as a personal pursuit and do not wish to share their experiences with other teachers (Albion, 2008; Riel & Becker, 2000; Schlager & Fusco, 2004). This may result from a fear of being critiqued by other colleagues (Parr & Ward, 2006). However, many teachers simply find it difficult to articulate their practice and the rationale that underpins it (Loughran, Milroy, Berry, Gunstone, & Mulhall, 2001). This leads us to question how knowledge sharing and discussion in the context of practice can be more effectively encouraged and

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supported between teachers. This study focuses on one possible answer: the use of a wiki to support teacher portfolios. Contemporary uses of and issues with wikis to support professional development will first be discussed and then the use of wikis to support teacher portfolios will be considered.

1.1. A wiki to support teacher professional development

A wiki is an online "system that allows one or more people to build up a corpus of knowledge in a set of interlinked web pages, using a process of creating and editing pages" (Franklin & Van Harmelen, 2007, p.5). A user can incorporate text, images, audio, video, files, and hyperlinks to other websites within a wiki (Robertson, 2008). Some wikis allow pages to be password protected, provide for restricted users and viewers, and allow certain levels of administrative control, while other wikis are entirely open for anyone to change (Schwartz, Clark, Cossarin, & Rudolph, 2004). In order to protect against undesired changes to a wiki, individual changes are recorded with a date and time stamp, and page histories are kept (Parker & Chao, 2007). Such features protect wikis from vandalism and/or inadvertent deletion (Engstrom & Jewett, 2005). Wikis also have discussion and comment features that allow participants to discuss any changes to pages or new entries (Rosen and Nelson, 2008).

Wikis have been utilised for a wide variety of professional developments to both extend existing practices and develop new ones. Five positive attributes that are commonly linked to wikis are: collaboration, organisation, operation, cognition, and emotion (Biasutti, 2011; Cole, 2009; Sheehy, 2008). Firstly, in terms of collaboration, the inherent aspects of a wiki (a medium supporting shared knowledge creation and version management) easily support group processes such as collaboration (Cole, 2009; Ramanau & Geng, 2009). The use of a wiki can also extend collaboration beyond a classroom (Guth, 2007). Secondly, a wiki can support greater organisation of material through page creation and hyperlinking between different pages (Schwartz et al., 2004). Thirdly, wikis are easy to operate requiring little background knowledge and in turn, are easy to sustain (Cress & Kimmerle, 2008), making education more cost effective (Gilbert, Morton, and Rowley, 2007). Fourthly, the uses of wikis have been argued to lead to enhanced cognition. There is evidence that creating content for a wiki enhances writing skills, due to an awareness that other people will engage with the content (Jacobs, 2003). Wikis can also support debate, which has been shown to encourage higher levels of cognitive engagement (Kanuka, Rourke, & Laflamme, 2007) and more critical thinking (Richardson & Ice, 2010). Lastly, despite wikis not usually being set up for the purpose of emotive support, many participants can find that simply hearing about other participants' experiences is a good support for their own practice (Albion, 2008).

Despite the potential positive attributes of wikis, there are a number of complicating factors to be considered and accommodated if teachers are to be engaged with a wiki and for this engagement to be sustained (Cole, 2009). These factors relate to design issues, personal aspects of participants, and wiki maintenance. In terms of design, researchers comment that online environments should not have a structure that is too formal (Hartnell-Young, 2006; Schlager & Fusco, 2003). Tonkin (2005) notes the importance of flexibility in a wiki's structure so that unexpected advantageous effects can be utilised. However, Tonken (2005) also notes the need for an efficient search function, effective navigation and categorisation, and file management abilities.

In terms of participant aspects, Cole (2009) indicates four key constraints relating to engagement: personal constraint in terms of confidence, technical constraint in relation to ease of use, educational constraint in regard to pressure from other commitments, and complete lack of interest. Personal constraints can be an issue if participants are not comfortable with their work being edited or extended by others, or even potentially deleted if found to be unsuitable (Wheeler, Yeomans, & Wheeler, 2008). Clear guidelines and expectations for contributions need to be established (Zydney, deNoyelles, & Seo, 2011). Technical constraints, which might limit teachers using a wiki, can be minimised by providing participants with exemplification of a wiki alongside their training (Sheehy, 2008). Educational constraints can simply relate to daily school life and participants not having genuine opportunities to engage in online activities. For participants to invest their time in wikis there must be a balance between the time invested and the benefits of the technology (Cole, 2009). Lack of interest may relate to participants not having a significant reason to use such an online system (Schlager, Fusco, & Schank, 1998). Leuf and Cunningham (2001, p.30) argue succinctly that "Not every situation benefits from becoming an open discussion or collaboration forum".

In regard to wiki maintenance, decisions need to be made as to whether a wiki is to be peer facilitated or led by someone external to a group (instructor, teacher, researcher, etc.). These decisions are important as non-participation can be a significant problem in maintaining wikis (Anderson & Simpson, 2004). There are certain considerations for peer facilitation versus leader facilitation in wikis. It is argued that peers can help each other learn through discussion while enhancing their own learning in the process (Gilbert & Dabbagh, 2005; Seo, 2007). However, with many wikis, initiation is required to encourage others to participate (Tsai, 2010). Sharing responsibility among participants also encourages knowledge construction (Wheeler et al., 2008). Scaffolding, which provides the necessary structure and supports to encourage participation (Vygotsky, 1978), is one of the major steps an instructor can take to maintain engagement in a wiki (Cole, 2009; Karasavvidis, 2010). It was found that participants' presence on a wiki can diminish if a leadership role is not taken (Shea et al., 2010). Leader initiation can help build participants' knowledge and enhance their confidence (Tsai, 2010). However, leader facilitation can result in participants responding to the leader as opposed to developing discussion among themselves (Dennen, 2005). It is recommended that a leader transfers the responsibility of starting discussions on to participants (Seo, 2007).

1.2. Teacher portfolios supported on a wiki

Teacher portfolios are useful tools that allow teachers to develop a model of their own theory of teaching and practice, and in turn, highlight what is worth documenting and reflecting on (Shulman, 1998). Loughran, Berry, and Mulhall (2006) have developed two mediums that offer a useful framework for teacher portfolios. These portfolios are called Content Representations (CoRes) and Pedagogical and Professional-experience Repertoires (PaP-eRs). The CoRe is typically developed by three to five teachers but it can also be done individually. Teachers decide three to six big ideas for a given science topic and age group of students. Examples of topics could be chemical equilibrium, the nature of matter, light, etc. Teachers then answer eight pedagogical questions for each big idea, e.g., Why is it important for students to know this? Limitations/difficulties connected with teaching this idea? etc. The CoRe has a grid structure where the big ideas run horizontally from left to right and the pedagogical questions run down the left hand side (See Fig. 1). PaP-eRs take the form of a narrative, are done individually and are intended to give context to a particular aspect of the CoRe. One CoRe can have any number of PaP-eRs connected to it.