Online communities of teachers to support situational knowledge: A design-based study

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This paper describes a design-based research study in which an online platform for teachers was designed and implemented over 3 years. The study uses a networked learning approach to support teachers in the transition from university into service. It addresses the question of how online communities of teachers can support the development of situational knowledge. The paper describes the potential and the challenges of designing and implementing learning networks for teachers. A major challenge identified is the need for design that supports trust and stability within large networks. Significant potential is identified through the reuse of knowledge and greater collegiality within the profession. The platform, TeachConnect, was developed as a collaboration between academics at eight Australian universities, to create a platform to support teachers across the boundary from preservice into the profession. The study presents results from design and implementation, and includes site usage statistics and coding of types of support present within the platform. The paper contributes design principles for online communities of teachers and raises theoretical questions about future online communities.

Introduction

In the twenty-first century, many professions have changed due to the move towards a *networked society*, with increased connectivity causing radical social, cultural, and economic shifts (Castells, 2011; Van Dijk, 2012). The networked society has changed the way that professionals connect to knowledge, and the way that they connect with each other, and the teaching profession is still adapting to make best use of these changes (Jones, 2015). In addition to the many technologies (including tools, devices, platforms, apps, etc.) that have been developed to enhance learning and teaching, the Internet (by providing space for communication and interaction) has also inspired users to develop communities that aim to facilitate different types of peer support for teachers (DeWert, Babinski, & Jones, 2003; Herrington & Herrington, 2004; Jones, Dana, LaFramenta, Adams, & Arnold, 2016; Kelly & Antonio, 2016; Kelly, Clará, & Kickbusch, 2015; Lee & Brett, 2013; Lin, Lin, & Huang, 2008; Maher, Sanber, Cameron, Keys, & Vallance, 2013; Maxwell, Harrington, & Smith, 2010). These examples show the potential of research-led communities that provide peer support for teachers. This research is motivated by the research question: How can online communities of teachers provide support for developing situational knowledge about teaching practice?

This paper contains the results from a design-based research (DBR) project called TeachConnect (http://www.teachconnect.edu.au) that provides a platform for community support for preservice teachers in Australia throughout their transition into the profession and beyond (Kelly, 2013; Kelly, Clará, Kehrwald, & Danaher, 2016). The work uses a methodology of DBR which is characterised by an iterative development of the design artefact—through testing in authentic conditions (rather than in laboratory conditions), and the involvement, during design planning, of those who will eventually be using the design (Barab & Squire, 2004; Collins, 1992; Collins, Joseph, & Bielaczyc, 2004). In accordance with the methodology, the description of the design project seeks to make a contribution through: (a) developing an understanding of the effectiveness of the designed artefact (the online platform and related practices); (b) articulating transferable design principles tested in the work; and (c) making a theoretical contribution to the positioning of online teacher communities. These contributions provide the structure for the following sections of the paper: action research, design principles, and contribution to theory.

The action research component of TeachConnect has the aim of effecting change in the education sector rather than simply interpreting it (Carr & Kemmis, 2003). The TeachConnect project was motivated by: (a) the challenges faced by early career teachers in Australia and resulting attrition (Buchanan et al., 2013; Dicke, Elling, Schmeck, & Leutner, 2015; Ewing & Manuel, 2005; Johnson et al., 2015; Veenman, 1984); (b) the recognition that many Australian teachers miss out on receiving formal support such as mentoring and induction (Kelly, Reushle, Chakrabarty, & Kinnane, 2014; McKenzie, Rowley, Weldon, & Murphy,

2011); and (c) the potential for an improvement in online peer support for Australian teachers (Clarà, Kelly, Mauri, & Danaher, 2015; Kelly et al., 2015).

The second component is the development of design principles for online communities of teachers. TeachConnect is one of many similar, concurrent projects in the world (e.g., Jones et al., 2016; Marcelo García, Gallego-Domínguez, & Mayor Ruiz, 2016). Through publication of details of the context of design, the design iterations, and the consequences of design actions, a number of design principles can be developed along with an understanding of the situations in which these principles are transferable to other similar projects (Collins et al., 2004).

Finally, the work done to design and implement TeachConnect has its foundation in theory pertaining to the needs of preservice teachers. Certain types of knowledge are more valuable than others for beginning teachers, with situational knowledge prioritised over declarative knowledge (Clarà, 2015; Shulman, 1986). Further, much is known about the need for teachers to develop support, resilience, and agency through collegial relations (Edwards, 2011; Le Cornu, 2009). The cycles of design and implementation described in this study—and the attempt to engage teachers in the platform—has led to a deeper understanding of the context in which preservice teachers access online support, and the types of peer support that are significant for them.

Background

A language for designing online learning networks

The ontological foundation for the project is that of teachers as individuals who have a professional identity and connect to other individuals and knowledge within a network. This is the stance of *networked learning* (Jones, 2015), defined as "learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (Steeples, Jones, & Goodyear, 2002, p. 327). Teachers can be conceived of as a part of a greater community of teachers who draw upon one another and upon resources during their practice (Kelly et al., 2016). Whilst many of these connections occur between teachers face-to-face, there is an increased awareness within the profession of the importance of developing online learning networks (Trust, Krutka, & Carpenter, 2016). The design of the TeachConnect platform and the engagement strategy surrounding it (e.g., embedding it within higher education courses) represents an opportunity to improve the nature of learning connections and the opportunities for them to occur.

There is considerable potential for online learning networks of teachers and design can be used to fulfil this potential. Due perhaps to the recent recognition of this potential and the speed with which technology changes, there are still many gaps in our knowledge about how online learning networks function and how to design for them (Parker, Maor, & Herrington, 2013). For this reason, it is useful to adopt a common language for describing design principles. In this work, we adopt the framework of Goodyear and Carvalho (2013), which has three elements: *set design*, *epistemic design*, and *social design*. Set design refers to the look, feel, and tangible aspects of the environment; the stage within which the network is acted out. Epistemic design refers to the support for knowledge within the environment; the types of knowledge that can be represented in the network and the way that they can be interacted with. Social design refers to the support for relationships within the environment: the ways in which relationships are represented and the way that individuals can connect with each other. This framework has already had wide application to describe a range of existing online learning networks (Carvalho & Goodyear, 2014; Kelly et al., 2016).

Most online communities for teachers fall into one of four categories: nationwide government funded, statewide government funded, commercial, institutional, and cross-institutional (Table 1). TeachConnect falls into a fifth category as a cross-institutional community of teachers (Kelly et al., 2015).

Table 1
Types of online communities used by preservice and early career teachers in Australia with examples (after Kelly et al., 2015)

Type of community	Example of community type	Description of example
Nationwide, government funded	Scootle Community http://community.scootle.edu.au	Federal Government supported site (run by Education Services Australia) to facilitate a social network (Facebook style) around Scootle resources in particular and the teaching profession in general. Available to most educators in the country.
Statewide, government funded	The Learning Place http://education.qld.gov.au/ learningplace/	State Government supported site (run by Education Queensland) with a large and widely used collection of resources for classrooms and professional development, with social network support (chat, blogs, learning pathways)
Commercial	Facebook groups https://facebook.com	A widely-used commercial site that supports many diverse groups of teachers. Some are openly available and some are private; ranging from the very small to the very large (Kelly et al., 2016)
Institutional	Education Commons (USQ) https://open.usq.edu.au/course/ info.php?id=62	A Moodle community of preservice and early career teachers supported by motivated faculty members who provide a library of articles, videos and mentoring through the site (Henderson, Noble, & Cross, 2013)
Cross-institutional	TeachConnect http://teachconnect.edu.au	A collaboration between eight teacher education institutions (universities), supported by the teacher registration body

Ways that teachers support one another online

Teachers need to develop two types of knowledge that can be classified as *declarative* and *situational* (Clarà, 2015). Declarative knowledge refers to knowledge that can be separated from its proponent, for example, knowing who to ask for information, knowing where to find resources, and knowing the content of subject areas. Situational knowledge refers to knowledge that cannot be separated from its proponent and is integrated with the practice of teaching and is highly contextual, for example, knowing how to use certain pedagogy to teach certain content in a particular context (Shulman, 1986). Situational knowledge is argued to be more valuable for beginning teachers and thus online communities of teachers need to be designed to support the development of this knowledge (Clarà et al., 2015). Teachers are only likely to engage in collaborative reflection—an indicator that situational knowledge is being developed—in communities where there is a sense of presence, privacy and stability within the network that leads to the trust required to discuss practice (Clarà et al., 2015; Griffiths, 2000).

These two categories of support for developing declarative and situational knowledge can be deepened with reference to the six ways that teachers support one another in online spaces (Table 2) (Kelly et al., 2016). There is evidence that current commercial online learning networks of teachers have a tendency to support declarative knowledge but not situational knowledge (Kelly & Antonio, 2016; Staudt, St. Clair, & Martinez, 2013; Steinbrecher & Hart, 2012).

Table 2
Mapping of types of knowledge needed by teachers to types of support

Type of knowledge	Description (Clarà, 2015)	Type of support	Description (Kelly & Antonio, 2016)
Declarative	Separable from proponent	Pragmatic support	Responding to questions that have clear answers, e.g., requests for resources
		Socialisation	Reproducing cultural norms of the profession, e.g., sharing memes
		Convene relations	Making connections between teachers
Situational	Integrated with practice; contextual	Support reflection	Assisting teachers to move from confusion through to clarity around aspects of their teaching practice
		Model practice	Sharing examples of teaching practice
		Provide feedback	Giving critical responses to other teachers on aspects of their practice

Existing design principles for online networks of peer support

A number of heuristics for developing online communities were hypothesised by Shirky (2010) and Kraut et al. (2012) based upon both theory and limited evidence. These principles apply to any online community, not just teachers, and form a foundation for this DBR.

- Start small with a core group (e.g., 10 - 100 users) and make it a strong community that embodies the values that are desired for the network. This serves two purposes. Firstly, it is a useful barometer, as if the community relies on being big to function then it is unlikely that it will ever grow to the desired size. Secondly, as the community grows in membership, the values held by this core group are the values that are likely to be perpetuated, so it pays to give close attention to details within a smaller group (Shirky, 2010).
- Understand what motivates the members and make sure that the learning network provides for this motivation (Kraut et al., 2012). Both intrinsic and extrinsic motivation ought to be considered as ways to encourage users to engage with the community. Intrinsic motivation can be addressed by ensuring that users have autonomy (freedom to act in a way that they find harmonious), connectedness (a human connection), and competence (no need to learn new skills to participate) (Ryan & Deci, 2000).
- Any platform has a set of default options in set design, social design, and epistemic design, for example, default alerts, privacy settings, and display options. These defaults ought to be used wisely to promote social connectivity and the types of knowledge that it is desired to be shared (rather than defaulting all settings to being closed) (Kraut et al., 2012; Shirky, 2010).
- Recognise that there will be many types of engagement within the platform and cater to these different types of engagement—there will be lurkers (Woo, 2015) as well as active participants and champions (Shirky, 2010).
- Have as low a threshold for active participation as is possible. Require a bare minimum of activity from users for them to have contributed something to the platform. This contributes to their engagement and presence within the platform and makes future contributions more likely (Kraut et al., 2012; Shirky, 2010).
- Be prepared to make changes as the network grows and to be responsive to what the community is asking for (Shirky, 2010). Changes need to be made quickly in response to the needs of teachers. This is in keeping with the principles of DBR (Barab & Squire, 2004).
- The epistemic design of the community should focus on supporting authentic context and activity. The knowledge held in the community should pertain to real problems and issues that teachers actually face in schools (Herrington & Herrington, 2004).
- Avoid ambiguity about roles within the community. Aim for clarity about who within a group holds the domain expertise and whose words should be attended to (Lin et al., 2008).

- A barrier to co-creation of knowledge can be present through overly diversified foci, with members having different interests or disagreeing on the characterisation of a problem (Lin et al., 2008).
- Members can fear criticism from other members of the community, preventing them from sharing knowledge (Lin et al., 2008). Anonymity can mitigate this. Hur and Brush (2009) similarly found that anonymity and lack of physical accountability is one of the reasons why teachers were looking online for support, noting: "the analysis of interviews and observational notes suggested that online environments provided places where teachers could safely share issues that they could not share with local school teachers" (p. 293).

Findings from Hur and Brush (2009) add to this foundation suggesting that communities can help to combat isolation encountered in some school environments through perceived solidarity. Teachers want to participate in online communities to explore new ideas and to talk about what they did in their classrooms and how well it worked; to share ideas for possibilities, and to share ideas with teachers who teach different grade levels or subjects share together, that is, learning from teachers outside their immediate area. Finally, they were motivated by a sense of camaraderie from being an engaged part of a community and through feeling a shared culture (e.g., McLoughlin & Oliver, 2000).

Theoretical foundations for studying TeachConnect

The platform developed in this project was founded upon a networked learning understanding of how design can influence learning within a platform. The language of set, social and epistemic design serves as a common language for discussing the design features in the platform. The platform follows many prior attempts to analyse online communities forming *in the wild* as well as communities that were intentionally developed as a part of action research. A widely adopted paradigm for research into both types of communities is that of the community of practice (Lave & Wenger, 1991) and a review of communities in the wild shows the diversity of situations in which teachers form online support groups, that can be understood as various forms of sociocultural learning (Macià & García, 2016). The design principles from these studies form a foundation for developing a community. It prioritises the development of affordances for teachers to support the development of situational knowledge over declarative knowledge.

The reporting of the development of TeachConnect follows the suggestions of Collins et al. (2004) in reporting a DBR project. This section has described the broad aims and objectives of the TeachConnect platform with a focus upon its theoretical underpinnings. The methods section includes a description of each phase of the design process, including the role of the participants and a full description of the settings, with a focus upon the most substantial phase. Finally, we describe the outcomes in terms of action research outcomes, design principles and contributions back to theory.

Methods

In 2012 the DBR project TeachConnect (http://www.teachconnect.edu.au) was commenced with the aim of supporting teachers in the transition from preservice education into teaching service. The development of the platform resulted from three phases of design and implementation, primarily guided by the voice of the users of that platform—preservice teachers and those that support them. The phases were: (1) participant framing of the problem and the design approach; (2) a pilot study in two universities; and (3) a launch in eight universities with a subsequent (and ongoing) cycle of participant involvement and design improvement. At the time of writing in 2016 the platform has more than 800 users all based in Queensland, the majority of these being preservice teachers within Queensland universities and early career teachers commencing service in 2016. Ethics approval for each phase of the study was provided by institutional human research ethics committees.

Results in this paper focus upon Phase 3, the period following launch in eight universities. However, a brief description is provided of each of the prior phases. Results from Phase 3 include data from web analytics (usage statistics of the platform), the database of TeachConnect (metadata about users' activity), and coding of the types of knowledge present within the *community knowledge* section of the platform. Within the community knowledge section, teachers provide support for one another by answering and commenting on questions. The coding scheme described by Kelly and Antonio (2016) is used to determine the type of support being provided by teachers (Table 2).

Problem framing

A survey of 118 early career teachers showed that there was widespread support (95%) for both "being able to ask questions of experienced teachers" and "being able to access an easily searchable and moderated FAQ from all 1st year teachers in the country" (Kelly et al., 2014, p. 15). Short answers allowed teachers to provide details of what they would look for in an online platform, with responses such as "LOADS of resources and ideas for lesson planning" (Kelly et al., 2014, p. 15) and a detailed list specifying the need for chat, forums, links, and policy documents. These findings, along with interviews with education academics and practicing teachers, provided a foundation of understanding of the stakeholder needs. Further results from the Staff in Australia's Schools survey data show that many beginning teachers feel unsupported, with those in insecure employment or in rural areas most likely to miss out on support (Kelly, Sim, & Ireland, 2018; McKenzie et al., 2011).

Design and pilot study

A pilot study was conducted by developing a platform named *TeachQA*, the name being a reference to the need for teachers to teach, question, and answer, with the platform taking the form of a Q&A (question and answer) forum (Figure 1). The platform was developed by adapting open source Q&A forum software called AskBot (www.askbot.com). Its role was to serve as a low-cost proof-of-concept in which the idea could be tested in the real world. The pilot study was conducted in two universities in Queensland, Griffith University and the University of Southern Queensland with the support of the teacher registration board, the Queensland College of Teachers (QCT). In total,, 81 preservice teachers were involved.
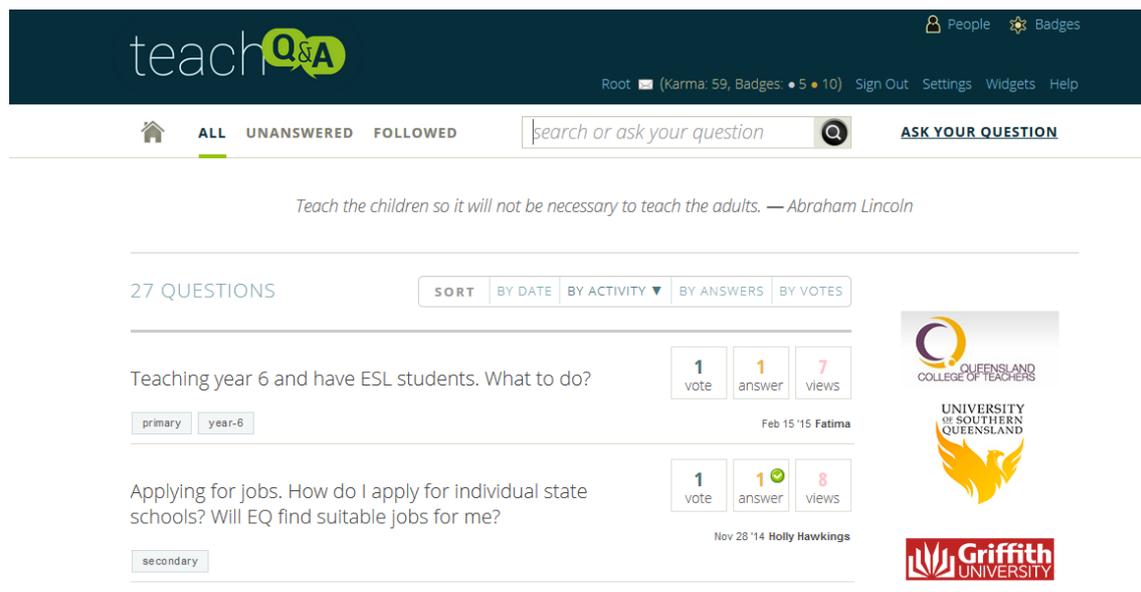

Figure 1. A screenshot of the layout and design of TeachQA

Interaction on the site was through the format of questions, which could be commented on and responded to by the community. In total, 27 questions were asked, 50 answers were provided by the community (any question could have multiple answers) and 568 total views of questions/answers occurred, as well as many comments on these questions and answers—a low level of activity (Kelly et al., 2016). This phase led to a realisation of the need for improved set design. The strong presence of logos was alienating students; the weak/faded appearance of the design made the site forgettable; and the navigation was not intuitive, requiring time to become familiar. The site needed a simpler and robust sign-on process as many students did not complete the registration process to be able to enter the site. Secondly, social design on the site was not sufficiently personal for teachers. The restriction to a formally structured Q&A did not suit the teachers' natural inclination towards relatedness, for example thank you, doubt, and discussion. In other words, the social design of the network was not facilitating users' sense of social presence.

Redesign and launch of TeachConnect

Following this pilot, funding was obtained to redesign and launch a platform to support beginning teachers on a state-wide scale. The results presented in this paper are from this current phase of the design-based research. Called TeachConnect, the platform was developed as an application based on the Connected Communities Platform (https://github.com/ConnectedCommunities), an open-source research environment for investigating the phenomena of digital communities established by the Connected Communities Research Initiative (https://www.qut.edu.au/science-engineering/our-schools/school-of-information-systems/service-science) at QUT.

User numbers were markedly increased compared to the TeachQA pilot study through the participation of all eight Queensland universities offering teacher education programs. In 2015, approximately 600 preservice teachers in final year teacher education programmes (either a 4-year undergraduate programme or a 1- or 2-year graduate programme) were invited to participate. In order to focus questions and reflections, this study was limited to participants with subject specialty areas in the STEM (science, technology, technology and mathematics) teaching disciplines. Preservice teachers at each of these universities were given a 1-hour workshop by the principal investigators where the rationale of the project was explained and where the platform was demonstrated with an opportunity for teachers to trial it, where participation in the platform was voluntary.

Results from the first year of TeachConnect

Design description of TeachConnect

TeachConnect is a social media platform for teachers that embraces the principle of *fractal design* (Clarà et al., 2015) by having a broad "community knowledge" area (all members) which emphasises support for declarative knowledge; and a series of smaller "mentorship circles" (typically composed of 30 preservice teachers and two experienced mentors) that emphasise support for situational knowledge. These two distinct areas are respectively described as: (a) a Q&A forum comparable to that developed in the pilot study utilising TeachQA (Figure 2), and (b) a number of private mentorship circles in which users were individually grouped with peers and mentors (Figure 3). Experienced teacher mentors were sourced through known networks.

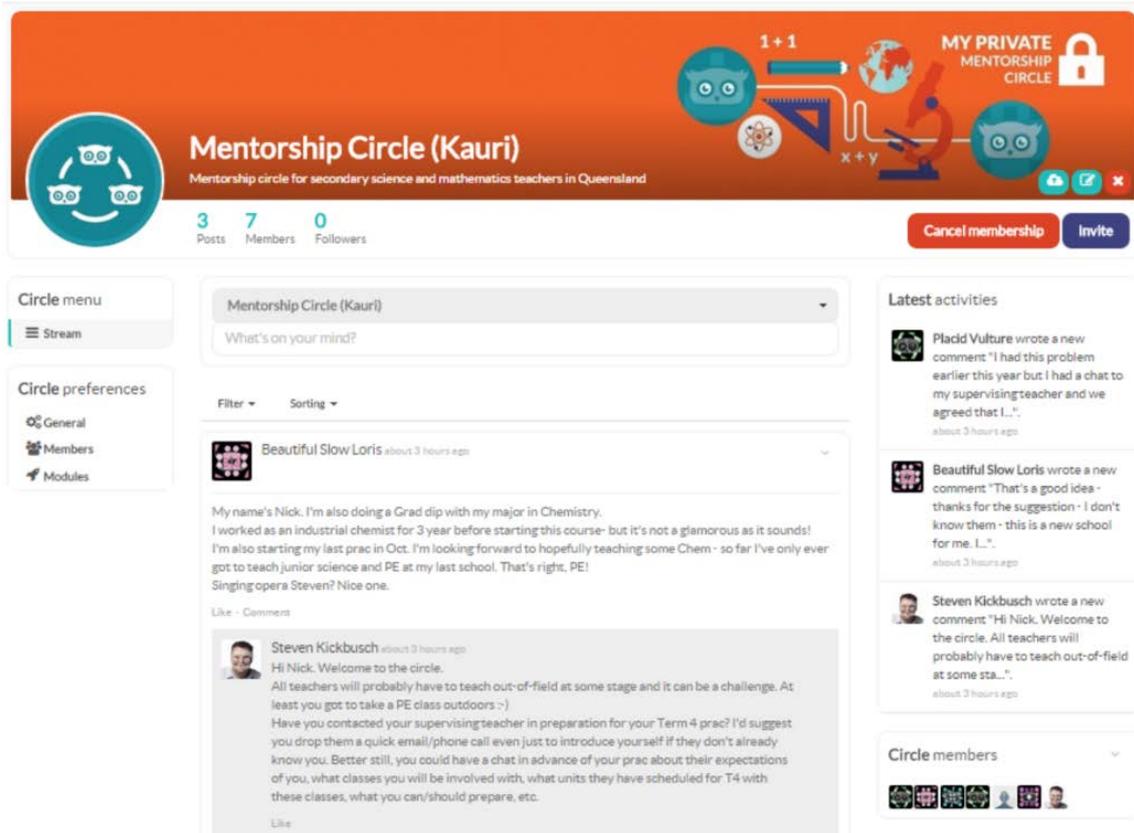*Figure 2.* Screenshot of Community Knowledge within TeachConnect

Figure 3. Screenshot of Mentorship Circles within TeachConnect

When users login to the platform their default view is their mentorship circle to provide a default of situational orientation. Users can use the menu to move between the two areas, in addition to the ability privately message one another.

Set design

The two sides of the platform (community knowledge and mentorship circles) were designed to establish a low threshold for entering and interacting within the platform; mentorship circles were designed to have the appearance of Facebook as much as possible and community knowledge was designed to resemble other online question and answer forums such as Quora (www.quora.com) or Yahoo! Answers (https://answers.yahoo.com/). The rationale behind this was that many users would know how to use these sites based on past experiences – adopting features from these user interfaces meant that TeachConnect users did not have to learn new skills. In addition, the imagery used in the site (e.g., stylised owls, apples, scientific equipment, books) were intended to be familiar without being patronising, again for ease of orientation.

Social design

The social design of TeachConnect was different within the two sides of the platform. Look and feel was designed to encourage users to enact those feelings of altruism that are prevalent within the teaching profession towards their peers and to support the development of users' professional identity. For example, as they become more comfortable within the TeachConnect network, users are able to transition from being completely anonymous in their interactions within the platform to revealing their identity, roles, interests and expertise if they desire. All user interactions, whether anonymous or not, allow users to accrue Karma points, which provide an indication of both their prevalence within the community (as measured by their interaction and contribution) and other users' response to these interactions, for example, *voting up* of an answer or response to another user's question.

The platform facilitated three types of social interactions: (a) at the level of the whole community within community knowledge; (b) at the level of a small, trusted group within mentorship circles; and (c) private one-to-one communication within messages.

TeachConnect responds to a need for teachers to have a space within which to discuss their practice without accountability. One means employed to achieve this was to limit site registration through a whitelist of education institutional domains that require authentication before access is allowed. The option for users to remain anonymous also significantly contributes to further easing users' apprehensions encouraging them to openly discuss all aspects of their professional practice, particularly negative or undesired incidents about which the TeachConnect community are able to offer expert advice, reassurance and/or guidance.

Epistemic design
The platform was designed for teachers to interact primarily through dialogue but also through the sharing of multimedia educational resources and knowledge objects. The platform supports hyperlinking, upload of files (e.g., PDF and Microsoft® Word documents), upload of images (which show within a conversation thread), and links to videos (which show a still image within the thread). Posts are tagged by users to enable re-use of knowledge, such that when a question is being asked prior, relevant questions are displayed to forestall the need to ask a question.

Quantitative findings

Quantitative results from the 12 months of the study (4 September, 2015 – 1 September, 2016) are shown in Tables 3 and 4. The most significant finding in these results is that 779 users registered for the platform, yet of these users only 185 actively participated.

Table 3
Descriptive statistics for community knowledge (CK) and mentorship circles (MC)

Measure	Value
CK: Questions	85
CK: Answers	164
CK: Comments	78
CK: Average answers/comments in a question	3.1429
MC: Posts	330
MC: Comments	506

Table 4
Website analytics

Measure	Value
Page views	35,574
Number of sessions	5877
Average session duration	6m 17s
Bounce rate	46.44%
Distinct users (IP address)	2,836
Registered users	779
Registered users – participating	185
Registered users – non-participating	597

Coding of teacher knowledge

All answers to and comments upon questions were coded to ascertain the type of support that teachers within the platform were providing to one another. Data were for the same date range as Tables 3 and 4. The decision making in applying the coding scheme from Kelly et al. (2016) is summarised by Figure 1. All data were coded by two raters and inter-rater reliability was assessed using Kraemer's Kappa. Kraemer's Kappa is an extension of Cohen's Kappa that allows for coding into multiple categories to be applied to each post. All data were initially coded with insufficient levels of agreement with a Kappa of 0.55. This low agreement was likely due to two reasons: (a) one of the raters did not have an educational background which seemed to influence the interpretation of the coding scheme; and (b) training in applying the scheme was inadequate. A second attempt at coding was carried out by two researchers with educational backgrounds who received further training including the provision of the diagram seen in Figure 1. The category N/A applies where none of the other six categories were a fit. The second round of coding,

produced a Kappa of 0.85 indicating strong agreement, and all discrepancies were discussed for 100% agreement.

The results, Table 5, show that the majority of responses were teachers providing support by advocating practical solutions. These were typically short responses such as links to a URL (e.g., to a resource or a blog post) along with a recommendation that this is a useful link. Over a quarter of all responses were coded N/A, which were typically teachers thanking one another or saying "me too" to a post. There were no instances of feedback on teaching practise.
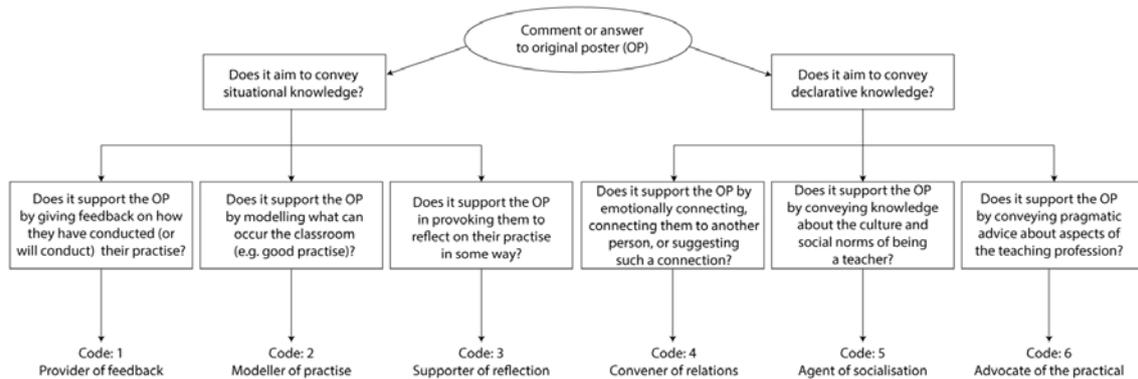

Figure 1. Coding scheme to classify support provided by teachers within TeachConnect when responding to a question from an original poster (OP), after Kelly et al. (2016)

Table 5
Coding of support provided through the platform

	Provider of feedback	Modeller of practise	Supporter of reflection	Convener of relations	Agent of socialisation	Advocate of the practical	N/A	Total
Count	0	7	3	10	18	138	61	238
% of posts (n = 214)	0.00%	2.95%	1.27%	4.22%	7.59%	58.23%	25.74%	100%

Discussion

Effectiveness of the designed platform

The results reveal mixed findings about the use of the platform. It is clear from the coded data that the goal of teachers developing situational knowledge about the profession through their interactions was not met. The number of users involved in the platform suggest that the strategies for recruiting preservice teachers through face-to-face sessions worked successfully. However, the website analytics and analysis of usage shows that many users quickly ceased to be engaged with the platform after joining. The prevalence of pragmatic support within the platform suggests that it is useful for teachers to share declarative knowledge.

There were exceptions to this trend, especially in the mentorship circles, where some teachers appeared to have their teaching practice altered through engagement with the platform. For example, a mentor suggested to a student that use of *concept maps* might be a good teaching strategy in a lesson. There was a follow-up discussion in which the teacher continued to grow through the support of the mentor:

> Preservice teacher: The concept maps I received (maybe a third of the class - some others still in their books) generally had relevant information, but were lacking interconnections. I will now set them a concept map homework for their group-specific EEI.

> Mentor: The concept maps have given you a good insight into how the students are progressing. Have you modelled how to make interconnections to them?

> Preservice teacher: I had planned to walk them through the concept map example at end of lesson (demo and practice before their first experiment set up for EEI), but ran out of time. I'll walk them through it probably Monday, after they've (hopefully) provided their homework maps. Might try an audio/animated ppt to walk through (so I can script and be sure of timing), then open to Q+A. If time, will put onto the school site so they can access over weekend to help with their maps - time allowing (ha ha).

This discussion appears to have been helpful to the preservice teacher in question whilst also providing them with an alternative source of collegial support. Further, the other members of the group who have read this interaction have also gained knowledge about how to use concept maps. Additionally, the interaction serves as a reminder to all within the mentorship circle that online collegial support is available. However, such engagement in the circles was an exception rather than the norm.

The results suggest that the platform only partially achieved its stated goal of supporting teachers into the profession and beyond. The main purpose of the results is to serve as a proof of the concept that situational knowledge can be developed in an online interaction between teachers who did not previously know one another. The fact that so few instances of this situational knowledge occurred suggests that perhaps this happened despite—rather than because of—the design of the network. The question we address is this: How could this online learning network for teachers be improved through design?

Design principles

Based upon our experiences in designing and developing the network over three years a number of design principles can be espoused of what works and what does not work for online networks of teachers. A limitation of these findings is that they are anecdotal, drawn from conversations with students and academics involved in the project. We first discuss what worked in TeachConnect and then describe the lessons about what did not work well. Responses from students, teachers, and administrators alike tend to be positive to the idea that there is a need to address the design challenge of how to develop the best possible online community for teachers, and that TeachConnect represents progress on this front. The general things about TeachConnect that most resonated with participating teachers and organisations are outlined below in terms of set, social, and epistemic design.

Set design
- It is independent and data (e.g., conversations) are private, owned by the members of the community – this is reflected in the lack of institutional presence (e.g., logos) on the site -- and it focuses on the profession (e.g. inspiring quotes about education).
- It is single purpose (i.e., does not have to meet government or institutional priorities) and its appearance and design make it clear that its goal is to facilitate preservice and early career teachers supporting one another.
- It is simple, quick and easy to use so that there is a minimal threshold to overcome to commence using the site (a consequence of the one-step sign-on process facilitated by close co-ordination with universities).

Social design
- It is inclusive in orientation. It is not commercial and aims to have onside all organisations that are involved in the education and development of teachers. It is free and universal in that all teachers have access to the site, regardless of school system or status of employment. This focus on universal free access and a benevolent aim have served as a strong basis for gaining support for TeachConnect.
- It is restricted to individuals who have at some point been a preservice teacher, to maintain the focus upon developing professional practice.

Epistemic design
- Knowledge that can be separated from its context and proponent is co-created and re-usable (e.g., where to find resources, how to get accredited, how to navigate schools) and develops over time through the Community Knowledge aspect of the platform.

There were specific instances of design features that did not work and had to be redesigned with input from teachers. These ranged in scope from the very detailed to the general. For each we outline the design principle and then instantiate it with examples from the platform:

1. It is critical to understand the social norms within the teaching profession (and allow this to influence UI (user interface) and UX (user experience) design).

As described with reference to TeachQA (an early iteration of TeachConnect), teachers were unhappy when they were forced to converse in strict question/answer format—they wanted the opportunity to use free dialogue, and in particular to be able to thank each other. It is a culture of collegiality, with an observed sensitivity to interactions that have a reduced sense of human warmth. A similar design change is a redesign of the up/down arrows (seen in Figure 3) that allowed voting on a post, shifting this to a "like" button. The effect of this is to create a safer space – if someone says something that is not liked by the community, it will simply be ignored—there is no ability to *downvote* something.

2. Teaching is a highly context dependent profession and the social design needs to reflect this.

TeachConnect aims to facilitate peer social support for its members. The design of the mentorship circles ensured that all preservice teachers had at least two experienced teacher mentors. Through observation of these circles and from conversations with mentors during our role in supporting them, it appeared that one of the reasons why these circles failed to elicit engagement can be attributed to the mentors not having a sufficient context for mentors to understand teachers; and teachers not having a sufficient focus to overcome inertia an make an initial post. There was no clear basis upon which a mentor could begin to talk with a teacher, a problem that was compounded by the anonymity of many users. The platform relied heavily upon users voluntarily disclosing their context (e.g., type of school, number of years teaching, subject area, interests) so that mentors could help, and this disclosure did not occur, making it difficult for mentors to understand the context of the beginning teachers that they were trying to mentor.

Two major design changes were implemented in response to this. Firstly, teachers provided this contextual information when signing up into the site so that it could be represented within the site. Secondly, a major design change shifted focus away from teachers having a single mentorship circle to having the ability to pick and choose based upon their interests. There are now multiple circles (for subject areas and interests, such as behaviour management) and users choose which of these they wish to join. Mentors are now distributed to circles based upon their particular interests, for example, secondary science teachers in a secondary science circle, and so on. In hindsight, it seems apparent that such a change will facilitate greater engagement from both mentors and teachers; however, during the initial design, this was not clear.

3. The platform needs to have an inherent simplicity; speed and reliability should mirror user experiences with best-of-breed platforms.

User feedback frequently asked the question: "Why would I use this site over Facebook or Twitter?" (i.e., a private versus commercial social network sites). Whilst our reasons for this have been made clear in the Background section, it became evident that any argumentation around utility of the platform relies upon having a set design that is comparable to these best-of-breed platforms—teachers are accustomed to a level of quality in terms of user interface and appearance and will not accept anything below this. This has presented many challenges to continually upgrade the platform to meet these expectations. Once conclusion is that, where possible, existing best-of-breed platforms should be repurposed (i.e., for any small scale social teacher networks) rather than attempting to create and support a new platform. However, for large, national scale platforms (at which TeachConnect aims) there is a need for such design work to be done.

Contribution to theory

The work makes two contributions back to the theory on designing for online support for teachers by identifying overarching questions arising from the work, concerning the premise behind the project and the conditions required for teachers to create situational knowledge in online platforms.

1. Is the premise behind the TeachConnect project valid?

TeachConnect is based on the premise of using technology and design to provide the best possible online support for teachers. As a design candidate attempting to answer this question, TeachConnect raises far more questions than it answers. For example, it provides circumstantial evidence for the possibility of teachers forming meaningful situational knowledge about practice through online conversations with anonymous other teachers, but it does not provide a solution for how to do this in a sustained and systemic way. What could this look like? What does the future of online social teacher support look like?

One way to proceed is to look to other professions for inspiration. There are occasions where a single altruistic community becomes a known default place to go for a profession or group, with concomitant benefits for that group from a convergence of resources in a single place. Diverse examples can be found in the information technology profession in the Stack Overflow website (Mamykina et al., 2011) and The Crag in the rock climbing community (Lean, 2010). TeachConnect has not yet achieved this convergence, but it provides a foundation that may yet be able to produce such an effect. One factor that requires further investigation is the importance of leadership (e.g., from schools, university deans, and ministers) in driving such convergence.

2. What do we really know about teacher needs for creating situated knowledge in online platforms?

In the literature, there is a claim that private, stable, trusted spaces are needed for teachers to have conversations in which situational knowledge is developed (Clarà et al., 2015). However, the version of TeachConnect used in the present study has demonstrated that these conditions alone are not sufficient. Creating engagement and meaningful connections within an online community of anonymous teachers is a challenge, but one that we believe is solvable through more attention to social design. Of the three types of design for learning networks (set, epistemic, and social) it is this last that appears to have had the least success within TeachConnect. There is minimal support for sustaining social contacts once made, and few hooks from TeachConnect back into the world of the teacher (e.g., we deliberately avoided using any email contact to avoid spamming users). It is our belief that social design, through communications with users to create deeper connections, will lead to greater success of the platform—a belief to be tested in future iterations of design and user participation with the platform.

Returning to the research question, this paper has described an attempt to create an online community in which teachers were supported in developing situational knowledge. Results show only partial success in achieving this outcome; however, the design principles and theoretical questions raised by the study make a contribution to the next iteration of online platforms aiming to supporting teachers. In this work the research team attempted to adopt the strategies that were collected from the literature (e.g., starting small and knowing well the community for which we were designing)—however, it was only through the experience of developing TeachConnect that this abstract advice has come to be understood more deeply in the context of designing platforms for teachers. The aim in this paper has been to share the design principles arising from that experience so that others can better understand the complex challenges involved, particularly surrounding the need for a *clear focus* for any community of teachers in order to provide a basis for conversations to begin; and the need for teachers to be able to at a glance see the context (e.g., career stage, regionality, subject area) of other teachers to facilitate greater social engagement.

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