
Citation:

Iredale, A and Stapleford, K and Sheridan-Ross, J and Holbrey, CE and Tremayne, D and Farrell, L (2019) A review and synthesis of the use of social media in Initial Teacher Education. Technology, Pedagogy and Education. ISSN 1475-939X DOI: <https://doi.org/10.1080/1475939X.2019.1693422>

Link to Leeds Beckett Repository record:

<https://eprints.leedsbeckett.ac.uk/id/eprint/5957/>

Document Version:

Article (Accepted Version)

The aim of the Leeds Beckett Repository is to provide open access to our research, as required by funder policies and permitted by publishers and copyright law.

The Leeds Beckett repository holds a wide range of publications, each of which has been checked for copyright and the relevant embargo period has been applied by the Research Services team.

We operate on a standard take-down policy. If you are the author or publisher of an output and you would like it removed from the repository, please [contact us](#) and we will investigate on a case-by-case basis.

Each thesis in the repository has been cleared where necessary by the author for third party copyright. If you would like a thesis to be removed from the repository or believe there is an issue with copyright, please contact us on openaccess@leedsbeckett.ac.uk and we will investigate on a case-by-case basis.



A review and synthesis of the use of social media in Initial Teacher Education

Journal:	<i>Technology, Pedagogy and Education</i>
Manuscript ID	RTPE-2017-0140.R2
Manuscript Type:	Original Article
Keywords:	Social media, Initial Teacher Education, Technology, synthesis, literature review

SCHOLARONE™
Manuscripts

A review and synthesis of the use of social media in Initial Teacher Education

Iredale, A.; Stapleford, K.; Sheridan-Ross, J.; Holbrey, C. E.; Tremayne, D.; Farrell, L.

Abstract

Several previous studies have reviewed the literature surrounding the use of technology in teacher education. This literature review takes a specific focus as it addresses the use of social media in initial teacher education. It seeks to explore what constitutes effective use of social media in supporting the development of new teachers in all sectors of initial teacher education (ITE), including Primary, Secondary, English Language Teaching (ELT) and Lifelong Learning.

We seek to develop and share a deeper understanding of the relationship between social media and the participation and collaboration of pre-service teachers in initial teacher education. The findings of the review include issues surrounding community, pedagogy and design, and this synthesis provides a significant exploratory contribution to the development of effective teacher education and training across the UK curriculum.

Introduction

Several previous studies have reviewed the literature surrounding the use of technology in teacher education (see inter alia Attwell and Hughes, 2010). This systematic, [exploratory](#) literature review takes a specific focus in this field as it addresses the use of social media (SM) in initial teacher education (ITE). It seeks to explore what constitutes effective use of social media in supporting the development of new teachers in all phases and sectors of teacher education, including Primary, Secondary, English language teaching (ELT), and Lifelong Learning. We have defined social media broadly as a range of media that people can use to connect and communicate. Specifically we have included Facebook, Twitter, blogs, wikis under this definition.

We are grateful for the range of previous literature reviews pertinent to the use of technology in ITE. These recognised the need for ITE providers to develop technology-related skills for teachers working in the lifelong learning sector in England. In England ITE providers can be school centred or University based. Our starting point follows from their indication of the critical factors in the literature, those of peer, small group and informal learning, linking theory to practice, reflexivity, and more broadly the effective use of what they term ICT for learning. [In this sense it is necessarily qualitative in that most of the existing literature in the field refers to small, qualitative studies.](#)

Research aim

We seek to develop and share a deeper understanding of the relationship between social media and the participation of pre-service teachers in initial teacher education. This review draws upon previous literature in the use of Information

Communications Technology (ICT) in formal educational settings. It highlights several themes, including the range of tools, the underlying principles and pedagogical models, benefits to trainee teachers (for example reflective practice and academic principles of curriculum design). The findings of the review and synthesis will contribute to the development of effective teacher education and training.

Research questions

In preparation for our literature search we identified three main aims for the review that would support our rationale for search criteria as follows:

1. What constitutes effective use of social media in teacher education?
2. What are the pedagogical principles underpinning the use of social media in initial teacher education?
3. What are the implications for further research in the use of SM in ITE?

Background

ITE is a broad field of education concerned with the training of teachers as professional practitioners. In the UK and globally most programmes of study are underpinned by sets of professional standards which provide a framework for the skills, knowledge and values required by teachers. Among the skills expectations of teachers is the use of technology in the classroom, particularly with the advent of technology use in the everyday lives of children and young people. Teacher educators incorporate technology skills development into their programmes in order to model the behaviours expected in the classroom. According to Iredale (2012: 3), drawing upon Leinhardt and Greeno (1986), and Shulman (1986),

“teachers develop their knowledge about teaching and learning situations through repeated classroom teaching experiences and interactions with teachers. This has resulted in an increasing alignment of the teacher education curriculum with the situated nature of learning for student teachers”.

Situated learning for student teachers may include the use of social media as an integral part of, or peripheral to classroom practice, particularly in adult and professional learning (for example ELT and Lifelong Learning). It is perhaps not surprising therefore that social media tools have become embedded within ITE curriculum design as knowledge and practice between the classroom and ITE inform each other.

Prior to any discussion regarding the effective use of social media it is worth outlining the more general context of technology and pedagogy. One seminal author in ITE is Shulman (1986) who introduced the notion of pedagogical content knowledge (PCK) and the importance of the complex relationship between teachers' knowledge about content (CK) and pedagogy (PK). A number of studies recognise the importance of the digital age and the importance of ICT in the training of pre-service teachers (Arslan, 2015; Tajudin & Kadir, 2014; Thomas, Herring, Redmond, & Smaldino, 2013). Technological Pedagogical Content Knowledge (TPCK) builds on PCK (Shulman, 1986) and represents a new understanding of the complete relationship between content and pedagogy in a modern technological world. This integrative model was initially introduced to the educational research community by Mishra and Koehler (2006) as a guide to what teachers need to know and be able to teach with technology although it was later reintroduced as TPACK (Koehler and Mishra, 2009), as a term easier to remember and pronounce. TPCK or TPACK emphasises the connections and relationships between the different components of knowledge in the model and recognises that such multi-faceted and complex knowledge will quickly change and rapidly become out of date and obsolete (Alev, Karal-Eyuboglu & Yigit, 2012; Angeli & Valanides, 2009).

Structure

Section 1 has introduced the literature review, setting out the aim and questions and a brief background to the literature surrounding technological and pedagogical content knowledge (TPCK). Section 2 provides the methodology, incorporating the scope, procedure, analysis and the ethical considerations pertaining to the literature

search. This section concludes with a discussion of the challenges and limitations of e-research.

Section 3 takes a thematic approach to the literature review, based upon the codes and categories developed during the selection process. These themes are broadly concerned with the following:

- Community
- Pedagogical principles
- Curriculum issues

Section 4 returns to the research questions, providing a conclusion that draws together the findings from the literature in relation to the following sections:

- Effective use of social media
- Pedagogy and theory
- Implications for further research

Methodology

Inclusion/exclusion criteria

The literature in this review is drawn from peer reviewed academic journals in the fields of higher education, teacher education and educational technology published between 2009 and 2016 inclusive. The objectives of this review are grounded in evidence and its intention is to inform practice; as such the review draws mostly on peer-reviewed published **qualitative empirical** research **articles** and conference proceedings. Books and book sections that detailed research projects and/or case studies on the use of social media in teacher education were also included. Policy documents were excluded, consisting largely of advisory guides around topics such as cyber bullying and safe use of social media in teaching and learning. Unpublished literature such as PhD theses were excluded as were less-academically rigorous literature such as blogs and opinion pieces. Finally, for practical reasons, we only considered papers published in English.

We made no inclusion/exclusion decisions based on methodological design as the findings would be of interest regardless of data type; so the review includes quantitative, qualitative and mixed methods research design. In terms of quality of literature, we made no judgement as the fact that the papers are published in relevant peer-reviewed journals presupposed a certain quality standard. The literature included in the review is all published since 2009 when the Attwell and Hughes (2010) review, from which this review arose, was published.

Initially, the literature searching centred around UK initial (or pre-service) teacher training in the primary and secondary (compulsory education) sector but this was later expanded to include post-compulsory education teacher training (further and higher education) as well as non-UK based teacher training; a small number of papers reported on using social media with in-service as well as pre-service teachers, which we have included. We felt that this allowed for inclusion of valuable research evidence, in particular, the initial search revealed a rich source of research literature

in the field of English Language Teaching (ELT) teacher education, which we decided to include due to the significant parallels with school-based teacher education and long-standing good practice of technology enhanced learning in this field.

Databases searched included general academic library search engines (e.g. Discover, Leeds Beckett University) as well as more subject specific databases such as the Education Resources Information Centre (ERIC) and Web of Science. We also focussed on specific relevant journal archives (Teaching and Teacher Education, Technology, Pedagogy and Education, Learning Media and Technology and Computers and Education) and government portals. This approach was an attempt to cover all bases and minimise possible gaps in our search. Key words and terms used Boolean operators and included “social media OR social networks AND teacher education OR training”, etc. later searches specified platforms for example “Twitter OR Facebook and teacher education”.

Procedure

Our study comprised five broad stages. After extensive discussion and deconstruction of the research question, the population and scope (stage 1), the review team developed a search strategy (stage 2). While identifying search terms, it became necessary to agree what could be considered ‘social media’; for example, although virtual worlds and eportfolios can be used to connect and communicate, this is not their primary function, and so we excluded studies on these tools. Next, the searching and screening (stages 3 and 4) followed an iterative process during which we constantly revised and refined our search terms and inclusion/exclusion criteria. We applied a three stage screening process (Gough, Oliver & Thomas, 2013) as our initial search was broad and general, largely based on titles; this stage produced a over 200 papers on the use of social media in teaching and learning, all of which was not relevant to our research questions although did provide some useful contextual and background information. The second stage of screening (applying the inclusion/exclusion criteria to abstracts) resulted in 98 papers relevant to our research questions. These were then read fully and reviewed which resulted

in the exclusion of further less directly relevant papers leaving us with a total of 48 papers for the review. A further round of searching was done using 'backward' and 'forward' reference list checking (Gough et al., 2012, pp. 125-126) through included papers' reference lists and via Google Scholar's citations facility. This strategy yielded minimal additional papers and was repeated until 'saturation' point. The final stage (stage 5) comprised synthesis and thematic analysis of the studies.

Analysis

We began with a general holistic coding (Saldana, 2009) of the papers according to social media platform, strengths, limitations, theoretical frameworks and type of study (see Table 1). This first stage of analysis revealed that the majority of papers were evaluative practitioner studies, which prompted the second stage of analysis to focus on the evaluative findings of each paper. The findings were categorised according to the main ideas and conclusions in the papers; these categories included:

- Reflective practice
- Professional support and mentoring
- Community
- Privacy issues
- User friendliness/perceived usefulness
- Identity/agency
- Academic and digital literacy development
- Participation and engagement
- Design issues
- Critical thinking support and scaffolding
- Collaboration and cooperation
- Sense of community
- Authenticity
- Sharing resources and ideas
- Use in future career
- Instructor communication and feedback
- Personal - professional tensions

We then conceptualised these categories into three meta-themes thus:

Community	Pedagogical principles	Design issues
Professional support and mentoring Identity/agency Sense of community Personal - professional tensions	Reflective practice Academic & digital literacy development Critical thinking support and scaffolding Collaboration and cooperation Participation and engagement Authenticity Privacy issues	User friendliness and perceived usefulness Sharing resources and ideas Use in future career Instructor communication and feedback

Ethics, validity and reliability

Being a literature review involving no human participants, the ethical considerations for this project were minimal, however the project lead sought and received ethical approval from the host institution by going through the regular procedures. The authors have conducted the research in line with the British Educational Research Association (BERA) guidelines regarding sponsors, authorship, publication, educational researchers and professionals, policy makers and the general public (BERA, 2011). The systematic, expansive and inclusive nature of conducting the review in addition to the shared responsibilities for all stages ensured rigour and trustworthiness (Lincoln & Guba, 1985 in Cohen, Manion & Morrison, 2011, p.180).

The core of three team members used e-research strategies to achieve effective collaboration, sensible task distribution and meaningful progress. We used Zotero as our database which allowed for identification of duplicate items, notes on progress and collaborative curation of content. Throughout the project Google drive was used as a shared project area in which spreadsheets, documents and mind maps were

created to log search terms, databases, and provide an overview of the literature as well as to begin to identify themes.

Despite a systematic and multi-faceted approach to literature searching, there is no guarantee we have reviewed 100 percent of the literature concerning social media and teacher education. We stopped searching the literature in December 2016 and the authors are aware that between then and the final draft of this review, it is likely that further research has been published. However, we consider that the eight years of research literature covered by this review presents a comprehensive, unbiased sample of literature (Gough et al., 2012, p. 113) on the topic of social media in teacher education.

Literature review

A total of 55 papers are reviewed in this section and are initially presented according to the tool or platform used, Table 1 provides an overview. Papers were spread more or less equally among popular platforms such as Twitter, Facebook, blogs and wikis but the single largest category was literature which discussed social media (or Web 2.0) in more general terms and that which reviewed or compared two or more platforms. There was a smattering of 'other' platforms which we have grouped together here, but could have equally been included in the named categories; Google Circles, Edmodo and Ning, for example, share features and functionalities with Facebook and blogs and wikis were often used in the context of an institutional virtual learning environment (VLE); further, portfolios, may take the form of purpose designed eportfolio platforms, but also often exist in the form of blogs or wikis, are listed separately. We have made the distinctions here, then, merely for clarity of visual representation.

Table 1: Summary of literature by social media platform (see appendix 1 for glossary of acronyms)

Tool/ Platform	No. of papers	Affordances	Limitations	Theories/Models	Types of studies
Blogs	11	peer engagement & reflection; develop academic writing/reflection skills; sharing resources/ideas; dialogic; formation of community; evidence of PD; tutor feedback	reluctance to feedback to peers; factors inhibiting writing academic blogs;	constructivist; CoP; sociocultural;	evaluative (AR); conceptual (participation; CoP; reflection);
Twitter	10	prof dev; collaborative; communication, connectedness, resource sharing; legitimacy; social presence. reduce isolation, expressing/addressing concerns; reflection; empower PLEs; mentoring	ambivalence/resistance around use with students; too social, privacy, scaffolding; technophobia;	CoP; Moir's phases of first year teaching; PLN; PLE; social capital;	evaluative- value; conceptual: CoP; PLN; SNA; digital literacy; perceptions & attitudes; content analysis
Facebook	4	enhance language learning (belief); socialisation/peer support; prompt feedback; communication; practical advice; motivation & satisfaction; collaborative learning (perceptions); readiness, enhanced learning (perceptions & pre/post test)	not for reflection/feedback on TP; no proven achievement benefits; need assigned tasks;	Tuckman's stages of group development; Col; SoC;	perceptions; evaluative; content analysis
Wikis	7	can develop KMP; improve satisfaction; critical evaluation of content; academic writing (public wiki); HOTS; communication; subject writing; peer review; PCK; task driven; use social features; use all features; generic skills dev; formative assmt, tutor review/feedback; collaboration, critical thinking, PCK;	collaborative writing; peer review/editing; best when blended with face-to-face ; need support to implement in class & with peer feedback	KMPs; social constructivism; knowledge construction;	evaluative - writing development, prof dev; conceptual - OLCs;
General/Combination (Web 2.0; SM)	11	collaborative, supportive; resource sharing; engagement; CPD; communication;	attitude & competence; technology , use; infrastructure, time, confidence, netiquette; education & modelling needed; tensions: personal/professional; identity; boundaries;	social constructivist, CoP; patterns of discourse; e-learning styles; participation; Activity Theory; social presence; social learning relations; TPCK; knowledge society; convergence;	evaluative; conceptual; SNA;
Other: Edmodo (1); VLE (3); Delicious (1); Goodreads (1); Google+ (1), Ning (1); Teachers & Technology CONNECT (1)	5	PD platform; improve practice; CP & TP ; curating sharing resources; improve T & L; peer interaction; collaborative reflection; pedagogic skills; impact on future career; 4Cs; PCK	limited SP; authenticity; ownership; anxiety;	Col; community of praxis; Byron report grid;	factors affecting; evaluative; conceptual

Some of the papers were in the tradition of Action Research in that they served to evaluate the tool or platform in terms of **what we term as its affordances and limitations, while others based their research on conceptual frameworks. We define 'affordance' in Table 1 as a set of embedded functions arising from the tool, and its associated relational structures arising from its use in a social situation (Boyd 2010).** Table 1 highlights the main theories and frameworks these papers made reference to as underpinning pedagogical concepts to their use of social media, some explicit, others implied. A significantly large number made reference to the Community of Practice concept and related ideas of social learning and social constructivism.

The remainder of this **section** will discuss each of the three broad themes identified in the review. The **section** concludes with a summary of the affordances and limitations of social media for trainee teachers and relevant theories and models.

Community

As Macià and García (2016) identified in a review of the literature related to informal online communities and networks for teacher development, a large number of studies focus on a Community of Practice (CoP) model. Within a number of studies this model is often implied rather than stated explicitly.

Among the literature explicitly adhering to the CoP model, Fitzpatrick's (2014) study demonstrated that an interactive blogging community aligned with key aspects of this model, while Paulsen, Anderson, & Tweeten (2015) used a Twitter-based CoP to support pre-service teachers in sharing their concerns. Both Hramiak (2010) and Boulton and Hramiak (2012) describe the benefits felt by participants who were members of online learning communities. In Boulton and Hramiak's study all the participants commented on the benefit of the community aspect of a blog tool for trainee teachers (p. 512) and a number of studies (including Boulton and Hramiak, 2012; Fitzpatrick, 2014; Hramiak, 2010; Paulsen et al, 2015; Wright, 2010) stress the significance of peer support within the online communities and the role this can play

in reducing isolation. Further corroboration of this is provided by Clarke and Kinne (2012) in their comparison of discussion boards and blogs; while discussion boards promoted collaboration and academic content, users reported higher rates of satisfaction and engagement in the more social but less academic blog platforms. Munoz, Pellegrini-Lafont, and Cramer's (2014) study, however, found contradictory results when using Twitter to facilitate a sense of community, although this may be, in part, due to the cultural and linguistic diversity of the participants, which is an under-researched area.

In Tsai, Laffey and Hanuscin's (2010) study, users found the community provided effective practice-related support suggesting that the online learning community can develop teaching skills in the absence of a course structure. However, the social media tools used in this study were institution-based with members consisting solely of the practitioners and trainees. In another closed group (Twitter), Mills (2014) reported that pre-service teachers found the platform beneficial for informal professional development in terms of accessing support around teaching resources and pedagogy in particular. This begs the question of whether this type of platform is perceived and used more positively by the participants than a public platform, considering issues of privacy, security and confidence.

Identity

Boulton and Hramiak (2012) focus on the development of professional identity through blogging for reflective practice while Vlieghe, Vandermeersche and Soetaert (2016) found that using a social reading site with pre-service literacy teachers helped participants 'construct an identity' as a reader (p. 808). Also concerned with developing identity, Nykvist and Mukherjee (2016) claim that pre-service teachers' digital identities established by social media are a key element that should be 'actively taught in higher education pre-service teacher courses' (p. 856).

However, there also exist "tensions" or conflict between personal and professional identity and this is explored by Kimmons and Veletsianos in their 2015 study on teacher professionalisation. Their study found that trainees had an awareness and

practised certain ('self-imposed') standards of 'appropriate' behaviour on their social networking accounts in view of their professional standing (Kimmons & Veletsianos, 2015, p. 488). They note that teachers appeared to acquiesce to pressure to change the nature of their participation without a full consideration of the potential change to their identity. This phenomena may lead, in the authors' view, to an erosion of the 'transformative and democratizing value of social media' (p. 495).

This social-professional boundary is further explored by Edwards, Darwent and Irons (2016) who considered the (under-researched) area of student-initiated and managed use of social media as a form of peer support amongst trainee teachers. The study addresses some of the tensions between informal learning and peer support via a closed Facebook group and the more formal, tutor-led aspects of a training course. They also question the ethical aspects of social media use in a professional context. The potential benefits of student-owned communities in terms of support and engagement are echoed by Deng and Tavares (2013), who investigated reasons for higher engagement with Facebook in comparison to Moodle discussion forums. Participation rates for Facebook were higher due to familiarity with the platform, stronger social connections and a 'sense of ownership'. The study's findings may be limited however, by the authors' lack of access to the Facebook group and therefore inability to analyse the nature – social or learning – of the discussions occurring therein. So, as Edwards et al. (2016) state, further research into student-initiated groups is needed to investigate this phenomenon in more detail.

Pedagogical Principles

A number of studies investigated the concept of learning or at least perceptions of learning resulting from social media use. This learning encompassed technological competence, (Dymoke & Hughes, 2009; Salminen et al., 2016), academic skills (Dymoke & Hughes, 2009; Kilic & Gokdas, 2014; Kivunuja, 2015; Wheeler & Wheeler, 2009) and professional debate (Coole & Watts, 2009).

Social constructivism featured throughout with the learning or perceptions of learning depending largely on a 'sense of community' (Kilic & Gokdas, 2014) where participants were encouraged to collaborate, discuss, share and challenge ideas and beliefs. This critical element was noted particularly in Wheeler and Wheeler's (2009) comparison of a wiki and a discussion forum. They found that the quality of students' writing was higher in the wiki indicating that students viewed this tool as a more academic platform than the discussion forum. However, in both this study and that of Dymoke and Hughes (2009), it was noted that the occurrence of collaborative writing (the main function of a wiki) was minimal; Wheeler and Wheeler noted that this is due to students' reluctance to critique each other's work. Similarly, the participants in Yang's (2009) study only felt able to challenge and question their peers or instructors when using an alias.

Some studies (Bravo & Young, 2011; Wheeler & Wheeler, 2009) successfully addressed the motivation issues when producing wikis through the collaborative production of authentic public wikipedia articles. Bravo and Young noted the authentic nature of the task prompted more careful consideration of posts and eventually increased confidence and appreciation of the truly collaborative process of co-constructing knowledge. Wheeler and Wheeler (2009) similarly found that the public nature of the wiki contribution promoted a higher standard of scholarly writing and Lai and Ng (2011) found that students only recognised the value of wiki-based tasks which were meaningful.

A number of studies discuss the merits of SM for collaboration between students (Carpenter, 2014; Dymoke & Hughes, 2009; Preston, Jakubiec, Jones, & Earl, 2015; Wheeler, 2009; Wheeler & Wheeler, 2009), with some feedback showing that participants valued the ease of collaboration not tied to a physical space and time (Preston et al, 2015). Online collaboration appears particularly effective when used as a way of bringing geographically distant individuals together (Winzenried, 2012).

Kilic and Gokdas (2014) evaluated the effectiveness of blogging as a tool for collaborative reflection by measuring the sense of community (SoC) and perceived learning. Correlations between perceptions of learning and SoC were found in another investigation into the use of blogs and the impact on student teachers' perceptions of learning (Top, 2012). Liu (2016) considers that a SoC amongst pre-service teachers using Facebook was positively affected by high browsing frequency, as were perceptions of collaborative learning, although this is based solely on self-reporting of frequency, so has some limitations.

Some studies trialled SM tools in attempts to develop participants' academic skills, in particular, writing and critical skills. Hadjerrouit (2014) and Wheeler (2009) used wikis to generate collaborative writing with trainee teachers and found that it produced minimal critically reflective collaborative writing. This finding is in line with Wheeler and Wheeler's (2009) study in which the participants were reluctant to change their peers' work and Wake and Modla's (2012) findings that despite appreciating the general collaborative nature of a wiki-based task, some participants did not appreciate giving and receiving feedback from peers. However, in Bravo and Young's (2011) study participants overcame this initial reluctance and eventually embraced the editing element of the activity. Wake and Modla (2012) suggested that this dislike of peer editing and feedback may be overcome by incorporating more explicit instruction on the process and value of it. That collaborative learning is not an instinctive occurrence and requires prompting and guidance was also noted by Lai and Ng (2011) and Carpenter, Tur and Marín (2016) thus suggesting that the potential of social media technology to promote collaborative learning and peer feedback does require instructor input and guidance to be effective.

Hadjerrouit's (2014) key recommendations for increasing collaborative writing using wikis include ensuring usability and not assuming all students are familiar with wiki technology; maximising intrinsic motivation by designing a more student-centred wiki; designing tasks to promote discussion, reflection and topic knowledge; supplementing the wiki discussions with more appropriate tools; incorporating peer

assessment; implementing a sociocultural pedagogy which encourages trust and offers assistance with the collaborative writing process and ensuring tasks are aligned to assessment.

Whilst the effects of participation in these spaces are reported to be both positive and constrained the impact on participants in terms of improvements to practice is not established as yet. In summary, current research appears to find no simple causal link between engagement, participation and subsequent impact on practice. Clearly there are risks associated with theories that have not been tested and evaluated, and this may be a reason why the literature has not yet addressed Rhizomatic Learning as a framework for investigating the use of social media in initial teacher education.

Participation

Deng and Yuen (2013) found in their study of two cohorts of undergraduate and postgraduate education students that several factors impact on participation with academic blogging. Structure and design and the particular technology used influence rates of participation and, significantly, the users themselves. Some users reported limited access to technology, others stated that they did not want to reflect on feelings in a public sphere. Across both groups, the main reason given for low participation was lack of time. The authors conclude that the success of academic blogs is not automatic but subject to a range of variables with individual motivation as key. These findings are supported by those of Tang and Lam (2014) who stated that active participation was crucial to successful online blogging. In their study many of those who failed to participate fully said that they found online blogging too time consuming. The authors report that this had a domino effect on the other students who, though initially posting, became disengaged by those who constantly failed to post or respond. The issue of participation being socially influenced is echoed by Hutchison and Wang's (2012) study, where some participants stated that they did not respond to posts because others had not done so, although many did feel that they had benefitted from seeing each other's posts.

Reflective practice

Perhaps unsurprisingly, numerous studies have investigated the affordances of social media tools for reflective practice. Fisher and Kim (2013) for example, observed rich and even therapeutic reflections from participants' blogs on their professional development as teachers. Hramiak, Boulton and Irwin (2009) noted the value of the facility in blogs for tutor input into student reflections, while Krutka, Bergman, Flores, Mason and Jack (2014) highlight opportunities for peer interactions when blogging. Wheeler (2009, p.10) noted that the collaborative nature of blogs enabled 'social comparison' and served to motivate students to improve their own writing and quality of reflection. Boulton and Hramiak (2012) echo this, arguing that their students were able to learn more through reading shared reflections. Yang (2009), Chuang (2010) and Krutka et al. (2014) report similar findings in that blogging supported opportunities to relate theory to practice in ways that were not taken up in their teacher education classrooms. Students developed skills in solving problems, but also to pose questions, building upon Freire (1985) and Dewey 1933). Reflective practice skills were promoted through collaboration, and trainee teachers found ways of engaging in social discourse. However, the public nature of the platforms identified in the research was a concern, particularly the perception of what could be seen as a 'safe environment' (Chuang 2010, p. 224). In addition findings pointed to the need for teacher educators to provide scaffolding in order to guide the students in relation to the skills required to develop their presentation strategies, and to promote criticality in their writing. Cultural differences were highlighted by Yang (2009), echoed by Chuang (2010) with regard to the influence of western educational approaches to questioning and criticality. Blogging was seen as a useful integration into teacher education curricula, given the provisos stated.

Design issues

Several articles dealt with issues that appear to fall into a broad theme associated with curriculum design and content development. We have synthesised these under five sections, although it must be acknowledged that there are considerable

overlapping discussions in many of the articles, not just in terms of this theme, but across the other two themes.

User friendliness and perceived usefulness

Kilic and Gokdas (2014, p.1171) refer to the impact of user-friendliness and familiarity of on perceived usefulness (Tsai, Laffey & Hanuscin, 2010). However, the relationship between digital literacy and perceived usefulness is inconclusive. Top (2012) found some correlations between IT competence and learning perceptions with regard to the use of blogs although Kilic and Gokdas (2014, p.1174) found no correlation between technological competence and perceived learning. Deng and Tavares (2013) compared Moodle, an institution-based platform with the public Facebook and found negative attitudes regarding ease of use with regard to Moodle compared to Facebook. The authors acknowledge this is partly due to the fact that Facebook is already a familiar platform as well as the intuitiveness and immediacy of Facebook – students were acknowledged more quickly for their contributions than in the Moodle environment. Hutchison and Wang (2012) stress the importance of not making assumptions that students have prior knowledge of the tools being used or enjoy using social networking tools, which inevitably affects some student perceptions of their usefulness.

Skills development/TPCK

Several studies investigated the use of social media tools in students' academic skills development. Kivunja (2015) for example, reported that although students were apprehensive about the use of social media for scholarly tasks, they were willing to try and that social media provided opportunities for students to develop a range of academic skills. Similar results were observed by Lai and Ng (2011) in their case study of a wiki project designed to develop student teachers' technological pedagogical skills, in particular, assessment. Pedagogic skills were also found by Wake and Modla (2012) to be supported and developed through the use of wikis. These were considered to successfully foster a constructivist learning environment in which participants collaborated on lesson planning and evaluation and critical analysis of pedagogy. Similarly, Biasutti and El-Deghaidy (2012) implemented a social

constructivist approach to a collaborative wiki project which had positive effects on participants' professional skills development, in particular knowledge management processes and student satisfaction. The wiki in this study, however, was not public, being housed within a VLE and there was no assessment of students' writing or critical skills.

Sharing resources and ideas

As well as skills (both generic and professional) development, social media tools have been successfully used for resource curation and sharing. For example, the use of blogs as a forum for exchange of resources and ideas (Fisher & Kim, 2013). Peer feedback regarding lesson planning and sharing materials was positively viewed by participants in Goktalay's (2015) study into the use of Facebook for trainees on placement. In their investigation of the social networking site, Ning, Reich, Levinson and Johnston (2011) also concluded that trainees were positively disposed to this in principle as a community of practice, but would require a more definite directive to use it. Edwards and Mosley (2011) researched the development of student teachers' cognitive domain through using social bookmarking to critically select, annotate and then share a bank of educational websites/resources. However, in the same way as other researchers highlighted, the success of this exercise also partly depended on instructor guidance regarding the usability and potential impact on learning of the content curated. Bravo and Young's (2011) study also addressed the 'usability' criteria (Hadjerrouit, 2014) partly due to the instructor provided guidance regarding Wikipedia conventions and ease of use was positively commented on by participants in Lai and Ng's (2011) study.

Use in future career

Further benefits include the impact on practice as participants indicated they would incorporate similar tasks into their own teaching (Bravo & Young, 2011; Fisher & Kim, 2013). However, this sort of activity may be more appropriate for certain language related disciplines (Bravo & Young, 2011). A similar benefit was expressed by student teachers who went on to use blogs for their reflective practice (Wheeler & Wheeler, 2009) or indicated on the whole they would continue to use

microblogging tools in their future professional lives (Carpenter et al., 2016; Tur & Marin, 2015). In contrast, Hramiak and Boulton (2013), whose study introduced trainee teachers to blogs during training with the express intention that this would be carried through to the NQT employment, found that this was not generally realised. This study found that very few trainees continued to use blogs as a reflective tool. Using SM for teaching and learning seems less popular generally, however (Carpenter et al., 2016; Hramiak & Boulton, 2013; Tur & Marin, 2015) and less than half had used blogs in their teaching and learning with pupils in their NQT year. The authors identify several reasons for training in use of SM not being carried through to employment and conclude that teacher educators should (basically need support from school leadership). Carpenter et al. (2016) consider this a missed opportunity and call for teacher educators to encourage and promote this aspect of SM usage.

Communication/Instructor feedback

Some of the more informal forms of social media such as Facebook, have been used to promote communication both student-student and student-instructor and instructor-student (Goktalay, 2015; O'Bannon, Beard, & Britt, 2013). Goktalay's (2015) study went so far as to include all stakeholders in using Facebook to communicate, so trainees were able to receive timely feedback on planning and preparation from mentors, for example. However, caution is recommended with this tool as there exists among students some strong opposition to using such 'personal' tools for educational purposes (O'Bannon et al., 2013). The issue of communication is perhaps more significant for student teachers due to the time spent on placement which can lead to feelings of isolation (Carpenter & Krutka, 2014). Likewise, social media has been shown to successfully provide a means of communication between cohorts (Carpenter et al., 2016; Kivunja, 2015) and students and their mentors (Wheeler & Lambert-Heggs, 2009) in the absence of face-to-face opportunities. Although the latter point out that the reduced opportunity for informal discussion and posts having a permanent record could 'militate against self-disclosure' (p. 329).

Conclusion

This literature review has reviewed recent literature (from 2009 to 2016) surrounding the use of social media in initial teacher education (ITE). The aim was to explore what constitutes effective use of social media in supporting the development of trainee teachers in all sectors of teacher education, including Primary, Secondary and Lifelong Learning. It has reported on the findings from the literature in order to contribute to the discussion and debate surrounding participation and collaboration for ITE students, and consequent design principles.

The findings report that students can feel overwhelmed by the amount of contributions and postings on a range of social media platforms, although this is more significant on Twitter. Issues surrounding usability and assumptions around digital literacy require a more nuanced pedagogical approaches by course designers and teacher educators to improve the effective use of social media in ITE. These include scaffolding, building trust, creating authentic tasks and aligning these to assessment processes. There is a danger, according to the literature, that teacher educators and course designers viewed students as a homogeneous group.

There was evidence that the social/professional divide was not always appreciated, leaving meaningful activity blurred in some online platforms, particularly blogging. The affordances of social media to encourage or develop reflective practice was noted by a range of articles, but again, findings cautioned against the assumption that students were able to apply critical thinking in these spaces without careful guidance and support pre-entry and embedded within the teaching during ITE programmes. Students reported a lack of time to participate in online spaces, with a preference for familiar social media tools over institutional tools built into virtual learning platforms for example, however it was also found that familiar online spaces were not seen as 'academic' in the same way as institutional ones. Indeed participation rates were found to be problematic where students found it challenging to establish their social presence (perhaps related to time pressures on full time 1 year courses), and where their focus was in responding to a final

assignment. Recommendations in this respect included providing a broader range of social media tools, to encourage social presence, and ensuring that early interventions were made by teacher educators.

The literature recommended a range of pedagogical principles surrounding the effective use of social media, including the provision of guided, structured reflective practice by teacher educators over time, although conversely the risk of too much interference can also be an issue. For example students reported a dislike of peer editing and feedback in some articles, although this may be overcome by incorporating more explicit instruction on the process and value of online reflective and collaborative writing and building confidence through peer and tutor dialogue. Certainly it is reported that more digitally literate students appeared to be more positive towards the use of collaborative writing tools (Brodahl, Hadjerrouit, & Hansen, 2011) and that blurred personal and professional boundaries incur conflicts, tensions and ethical issues in relation to curriculum design and participation.

It is important to stress that most of the literature included in this review refers to small, qualitative studies and our method does not provide a statistical aggregation of these studies due to the range of methodologies encompassed in the literature. In this event our findings are exploratory, although it is hoped that this systematic literature review will form the basis of future empirical studies into the effective use of social media in ITE, particularly with regard to the potential for full integration in the curriculum to support pedagogy and collaborative professional practices among developing teachers.

References

Alev, N., Karal-Eyuboglu, I. S., & Yigit, N. (2012). Examining pre-service physics teachers' pedagogical content knowledge (PCK) with Web 2.0 through designing teaching activities. In G. A. Baskan, F. Ozdamli, S. Kanbul, & D. Ozcan (Eds.), *4th World Conference on Educational Sciences (wces-2012)* (Vol. 46, pp. 5040–5044). Amsterdam: Elsevier Science Bv.

Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in

technological pedagogical content knowledge (TPCK). *Computers & Education*, 52(1), 154–168. <https://doi.org/10.1016/j.compedu.2008.07.006>

Arslan, Y. (2015). Determination of Technopedagogical Content Knowledge Competencies of Preservice Physical Education Teachers: A Turkish Sample. *Journal of Teaching in Physical Education*, 34(2), 225–241.

Attwell, G., & Hughes, J. (2010, September). Pedagogic approaches to using technology for learning: literature review. Retrieved 10 February 2016, from <http://dera.ioe.ac.uk/2021/1/harnessing-technology-literature-review-january-111.pdf>

Biasutti, M., & EL-Deghaidy, H. (2012). Using Wiki in teacher education: Impact on knowledge management processes and student satisfaction. *Computers & Education*, 59, 861–872. <https://doi.org/10.1016/j.compedu.2012.04.009>

Boyd, D. (2010). Social network sites as networked publics: Affordances, dynamics, and implications. In Z. Papacharissi (Ed.), *A networked self: Identity, community and culture on social network sites* (pp. 39–58). New York: Routledge.

Boulton, H., & Hramiak, A. (2012). E-flection: the development of reflective communities of learning for trainee teachers through the use of shared online web logs. *Reflective Practice*, 13(4), 503–515 13p. <https://doi.org/10.1080/14623943.2012.670619>

Bravo, V. J., & Young, M. F. (2011). The Impact of a Collaborative Wikipedia Assignment on Teaching, Learning, and Student Perceptions in a Teacher Education Program. *Canadian Journal of Learning and Technology*, 37(3), 1–25.

British Educational Research Association (2011). Ethical guidelines for educational research, Retrieved from: <https://www.bera.ac.uk>

Brodahl, C., Hadjerrouit, S., & Hansen, N. K. (2011). Collaborative Writing with Web 2.0 Technologies: Education Students' Perceptions. *Journal of Information Technology Education*, 10, IIP73-IIP103.

Carpenter, J. P. (2014). Twitter's capacity to support collaborative learning. *International Journal of Social Media and Interactive Learning Environments*, 2(2), 103. <https://doi.org/10.1504/IJSMILE.2014.063384>

Carpenter, J. P., & Krutka, D. G. (2014). How and Why Educators Use Twitter: A Survey of the Field. *Journal of Research on Technology in Education*, 46(4), 414–434. <https://doi.org/10.1080/15391523.2014.925701>

Carpenter, J. P., Tur, G., & Marín, V. I. (2016). What do US and Spanish pre-service teachers think about educational and professional use of Twitter? A comparative study. *Teaching and Teacher Education*, 60, 131–143.

- Chuang, H.-H. (2010). Weblog-based electronic portfolios for student teachers in Taiwan. *Educational Technology Research and Development*, 58(2), 211–227. <https://doi.org/10.1007/s11423-008-9098-1>
- Clarke, L. W., & Kinne, L. (2012). More Than Words: Investigating the format of asynchronous discussions as threaded discussions or blogs. *Journal of Digital Learning in Teacher Education*, 29(1), 4–13. <https://doi.org/10.1080/21532974.2012.10784698>
- Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education*. Abingdon : Routledge, 2011.
- Coole, H., & Watts, M. (2009). Communal E-Learning Styles in the Online Classroom. *Research in Education*, 82(1), 13–27. <https://doi.org/10.7227/RIE.82.2>
- Deng, L., & Tavares, N. J. (2013). From Moodle to Facebook: Exploring students' motivation and experiences in online communities. *Computers & Education*, 68, 167–176. <https://doi.org/10.1016/j.compedu.2013.04.028>
- Deng, L., & Yuen, A. (2013). Blogs in pre-service teacher education: exploring the participation issue. *TECHNOLOGY PEDAGOGY AND EDUCATION*, 22(3), 339–356.
- Dewey, J. (1933) *How We Think. A restatement of the relation of reflective thinking to the educative process*. Boston: D C Heath.
- Dymoke, S., & Hughes, J. (2009). Using a poetry wiki: How can the medium support pre-service teachers of English in their professional learning about writing poetry and teaching poetry writing in a digital age? *English Teaching-Practice and Critique*, 8(3), 91–106.
- Edwards, G., & Mosley, B. F. (2011). Technology integration can be delicious: Social bookmarking as a technology integration tool. In C. Wankel (Ed.), *Educating Educators with Social Media* (Vol. 1, pp. 207–225). Emerald Group Publishing Limited. Retrieved from <http://www.emeraldinsight.com/doi/abs/10.1108/S2044-9968%282011%290000001013>
- Edwards, M., Darwent, D., & Irons, C. (2016). That Blasted Facebook Page: Supporting Trainee-teachers Professional Learning Through Social Media. *SIGCAS Comput. Soc.*, 45(3), 420–426. <https://doi.org/10.1145/2874239.2874301>
- Fisher, L., & Kim, D. (2013). Two approaches to the use of blogs in pre-service foreign language teachers' professional development: a comparative study in the context of two universities in the UK and the US. *Language Learning Journal*, 41(2), 142–160.

- Fitzpatrick, K. R. (2014). Blogging through the music student teaching experience: Developing virtual communities of practice. *Research Studies in Music Education*, 36(1), 91–105. <https://doi.org/10.1177/1321103X13509350>
- Freire, P. (1985). *The politics of education: Culture, power, and liberation*. South Hadley, Mass: Bergin & Garvey.
- Goktalay, S. B. (2015). The Impact of Facebook in Teaching Practicum: Teacher Trainees' Perspectives. *Educational Research and Reviews*, 10(17), 2489–2500.
- Gough, D., Oliver, S., & Thomas, J. (2013). *An introduction to systematic reviews*. London: SAGE.
- Hadjerrouit, S. (2014). Wiki as a collaborative writing tool in teacher education: Evaluation and suggestions for effective use. *Computers in Human Behavior*, 32, 301–312. <https://doi.org/10.1016/j.chb.2013.07.004>
- Hramiak, A. (2010). Online learning community development with teachers as a means of enhancing initial teacher training. *Technology, Pedagogy and Education*, 19(1), 47–62. <https://doi.org/10.1080/14759390903579265>
- Hramiak, A., & Boulton, H. (2013). Escalating the use of Web 2.0 Technology in Secondary Schools in the United Kingdom: Barriers and Enablers beyond Teacher Training. *Electronic Journal of E-Learning*, 11(2), 91–100.
- Hutchison, A., & Wang, W. (2012). Blogging within a social networking site as a form of literature response in a teacher education course. *Educational Media International*, 49(4), 263–275. <https://doi.org/10.1080/09523987.2012.741197>
- Iredale, A. (2012) Down the rabbit-hole: Routinised practices, Dewey and teacher training in the lifelong learning sector. *Higher Education, Skills and Work-based Learning*, 2(1), 54-62.
- Kiliç, E., & Gökdaş, İ. (2014). Learning through Blogging: Use of Blogs to Enhance the Perceived Learning of Pre-service ICT Teachers. *Educational Sciences: Theory & Practice*, 14(3), 1169–1177. <https://doi.org/10.12738/estp.2014.3.1987>
- Kimmons, R., & Veletsianos, G. (2015). Teacher professionalization in the age of social networking sites. *Learning, Media and Technology*, 40(4), 480–501. <https://doi.org/10.1080/17439884.2014.933846>
- Kivunja, C. (2015). The Efficacy of Social Media Technologies in Academia: A Pedagogical Bliss or Digital Fad? *International Journal of Higher Education*, 4(4), 33–44. <https://doi.org/10.5430/ijhe.v4n4p33>
- Koehler, M. J., Mishra, P., & Cain, W. (2013). What Is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education*, 193(3), 13–19.
- Krutka, D. G., Bergman, D. J., Flores, R., Mason, K., & Jack, A. R. (2014). Microblogging about teaching: Nurturing participatory cultures through

collaborative online reflection with pre-service teachers. *Teaching and Teacher Education*, 40, 83–93. <https://doi.org/10.1016/j.tate.2014.02.002>

Lai, Y. C., & Ng, E. M. W. (2011). Using wikis to develop student teachers' learning, teaching, and assessment capabilities. *The Internet and Higher Education*, 14(1), 15–26. <https://doi.org/10.1016/j.iheduc.2010.06.001>

Leinhardt, G., and Greeno, J. G. (1986). The cognitive skill of teaching. *Journal of Educational Psychology*, 78(2), 75–95.

Liu, S.-H. (2016). The Perceptions of Participation in a Mobile Collaborative Learning among Pre-Service Teachers. *Journal of Education and Learning*, 5(1), 87–94.

Macia, M., & Garcia, I. (2016). Informal online communities and networks as a source of teacher professional development: A review. *Teaching and Teacher Education*, 55, 291–307. <https://doi.org/10.1016/j.tate.2016.01.021>

Mills, M. (2014). Effect of Faculty Member's Use of Twitter as Informal Professional Development during a Preservice Teacher Internship. *Contemporary Issues in Technology and Teacher Education (CITE Journal)*, 14(4), 451–467.

Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record*, 108(6), 1017–1054.

Munoz, L. R., Pellegrini-Lafont, C., & Cramer, E. (2014). Using Social Media in Teacher Preparation Programs: Twitter as a Means to Create Social Presence. *Penn GSE Perspectives on Urban Education*, 11(2), 57–69.

Nykqvist, S., & Mukherjee, M. (2016). Who am I? Developing Pre-service Teacher Identity in a Digital World. *Procedia - Social and Behavioral Sciences*, 217, 851–857. <https://doi.org/10.1016/j.sbspro.2016.02.012>

O'Bannon, B. W., Beard, J. L., & Britt, V. G. (2013). Using a Facebook Group As an Educational Tool: Effects on Student Achievement. *Computers in the Schools*, 30(3), 229–247. <https://doi.org/10.1080/07380569.2013.805972>

Preston, J. P., Jakubiec, B. A. E., Jones, J., & Earl, R. (2015). Twitter in a Bachelor of Education Course: Student Experiences. *Learning Landscapes*, 8(2), 301–317.

Reich, J., Levinson, M., & Johnston, W. (2011). Using Online Social Networks to Foster Preservice Teachers' Membership in a Networked Community of Praxis. *Contemporary Issues in Technology and Teacher Education (CITE Journal)*, 11(4), 382–397.

Saldaña, J. (2009). *The coding manual for qualitative researchers*. Los Angeles, CA: Sage.

Salminen, L., Gustafsson, M.-L., Vilén, L., Fuster, P., Istomina, N., & Papastavrou, E. (2016). Nurse teacher candidates learned to use social media during the international teacher training course. *Nurse Education Today*, 36, 354–359. <https://doi.org/10.1016/j.nedt.2015.08.026>

Tajudin, N. M., & Abd Kadir, N. Z. (2014). Technological Pedagogical Content Knowledge and Teaching Practice of Mathematics Trainee Teachers. In M. T. Ismail, S. Ahmad, & R. A. Rahman (Eds.), *Proceedings of the 21st National Symposium on Mathematical Sciences (sksm21): Germination of Mathematical Sciences Education and Research Towards Global Sustainability* (Vol. 1605, pp. 734–739). Melville: Amer Inst Physics.

Tang, E., & Lam, C. (2014). Building an effective online learning community (OLC) in blog-based teaching portfolios. *The Internet and Higher Education*, 20, 79–85. <https://doi.org/10.1016/j.iheduc.2012.12.002>

Thomas, T., Herring, M., Redmond, P., & Smaldino, S. (2013). Leading Change and Innovation in Teacher Preparation: A Blueprint for Developing TPACK Ready Teacher Candidates. *TechTrends*, 57(5), 55–63. <https://doi.org/10.1007/s11528-013-0692-7>

Top, E. (2012). Blogging as a Social Medium in Undergraduate Courses: Sense of Community Best Predictor of Perceived Learning. *Internet and Higher Education*, 15(1), 24–28.

Tsai, I.-C., Laffey, J. M., & Hanuscin, D. (2010). Effectiveness of an Online Community of Practice for Learning to Teach Elementary Science. *Journal of Educational Computing Research*, 43(2), 225–258. <https://doi.org/10.2190/EC.43.2.e>

Tur, G., & Marín, V. I. (2015). Enhancing learning with the social media: student teachers' perceptions on Twitter in a debate activity. *Journal of New Approaches in Educational Research*, 4(1), 46–53.

Vlieghe, J., Vandermeersche, G., & Soetaert, R. (2016). Social media in literacy education: Exploring social reading with pre-service teachers. *New Media & Society*, 18(5), 800–816. <https://doi.org/10.1177/1461444814547683>

Wake, D. G., & Modla, V. B. (2012). Using Wikis with Teacher Candidates: Promoting Collaborative Practice and Contextual Analysis. *Journal of Research on Technology in Education*, 44(3), 243–265.

Wheeler, S. (2009). Learning Space Mashups: Combining Web 2.0 Tools to Create Collaborative and Reflective Learning Spaces. *Future Internet*, 1(1), 3–13. <https://doi.org/10.3390/fi1010003>

Wheeler, S., & Lambert-Heggs, W. (2009). Connecting distance learners and their mentors using blogs: The MentorBlog Project. *Quarterly Review of Distance Education*, 10(4), 323–331.

Wheeler, S., & Wheeler, D. (2009). Using wikis to promote quality learning in teacher training. *Learning Media and Technology*, 34(1), 1–10.
<https://doi.org/10.1080/17439880902759851>

Winzenried, A. (2012). section 4 From a Distance: Teacher Librarian Training by Distance Collaboration. In *Library and Information Science Trends and Research: Asia-Oceania* (Vol. 2, pp. 69–91). Emerald Group Publishing Limited. Retrieved from
<http://www.emeraldinsight.com.ezproxy.leedsbeckett.ac.uk/doi/abs/10.1108/S1876-0562%282011%29002011b006>

Wright, N. (2010). Twittering in teacher education: reflecting on practicum experiences. *Open Learning: The Journal of Open, Distance and E-Learning*, 25(3), 259–265. <https://doi.org/10.1080/02680513.2010.512102>

Yang, S.-H. (2009). Using Blogs to Enhance Critical Reflection and Community of Practice. *Journal of Educational Technology & Society*, (2), 11–21.

Appendix 1: Glossary of acronyms

PD	Professional Development
4Cs	The four Cs (Critical thinking, Collaboration, Creativity, Communication)
AR	Action Research
CoI	Community of Inquiry
CoP	Community of Practice
CP	Cognitive Presence
CPD	Continuing Professional Development
HOTS	Higher Order Thinking Skills
KMP	Knowledge Management Processes

OLC	Online Learning Community
PCK	Pedagogical Content Knowledge
PLE	Personal Learning Environment
PLN	Personal Learning Network
SM	Social Media
SNA	Social Network Analysis
SoC	Sense of Community
SP	Social Presence
T & L	Teaching and Learning
TP	Teaching Practice
TPCK	Technological Pedagogical Content Knowledge
TPr	Teaching Presence
VLE	Virtual Learning Environment