



Social Media: A Flexible Collaborative Learning Space for Teacher Professional Learning to Integrate Education for Sustainability in Schools

Fariba Mostafa, Waikato University College

Abstract

The importance and need for education for sustainability (EfS) are recognised in the New Zealand Curriculum. Teachers face challenges, however, due to lack of support and professional learning about how to integrate EfS in school curricula. Social media can be used for teacher professional learning (TPL), and communication and resources can be combined to create flexible collaborative learning opportunities. However, there is little evidence to date of social media being used for TPL in EfS. Based on findings from a wider study exploring teachers' perceptions of professional learning through social media in EfS, this paper focuses on how social media facilitates flexible TPL in EfS.

The study adopted a mixed-methods approach using questionnaires, interviews, and a combination of document analysis and interviews in three phases. Findings from Phases 1 and 2 suggest that participants see TPL through social media as offering flexibility, and being useful for collaborative learning and support for teachers. In Phase 3, these findings are used to design and establish TPL for EfS teachers using Google+ to facilitate synchronous and asynchronous interactions between teachers, EfS experts, and resources. Although participants understood the flexibility of social media for enabling collaboration and providing support opportunities in EfS, the use of social media for professional learning is particularly attractive for teachers who work in rural and remote areas.

Keywords: education for sustainability; teacher professional learning; social media

Introduction and literature review

Our contemporary world is experiencing significant environmental problems that require immediate action. One course of action that has been advocated is education, particularly education for sustainability (EfS) (UNESCO, 2014), which provides knowledge, positive attitudes and behaviour, and develops skills for living sustainably in the world (UNESCO, 2014).

The New Zealand Curriculum has highlighted the importance of EfS in line with international standards (Ministry of Education, 2007). Sustainability, therefore, is a key theme in the New Zealand Curriculum and is integrated in its vision, values, and principles (Ministry of Education, 2016). The Curriculum emphasises the interdisciplinary role of EfS across all learning areas and suggests that EfS enables students to contribute to a sustainable future (Ministry of Education, 2016). It also encourages New Zealanders to take advantage of the opportunities afforded by new knowledge and technologies to protect a sustainable social, cultural, economic, and environmental future (Ministry of Education, 2007). A key aim is to raise citizens who are connected to the environment and can engage effectively in efforts towards sustainability in local and international communities. Therefore, the integration of EfS in education has been promoted

as cross-curricular learning across all educational settings in the New Zealand context (Bolstad et al., 2015). However, its implementation is partial and limited, ranging from little or no EfS in some schools, to advanced programmes such as Enviroschools in others (Eames et al., 2008). The Enviroschools programme is a whole-school approach that aims to promote and support sustainability through learning, commitment, and taking action with respect to the environment (Eames, 2010).

In the New Zealand context, EfS is a holistic, interdisciplinary approach in which teachers and schools play a critical role in implementation and success (Bolstad, 2005). However, schools and teachers face challenges in implementing EfS and promoting involvement to integrate it with the curriculum. Some teachers see the integration of EfS into other subjects as a burdensome part of the problem of an “over-crowded curriculum”. This reaction is more evident in secondary than primary schools (Eames et al., 2008, p. 45). To teach the subject, teachers need to determine appropriate information and knowledge to enhance students’ learning about sustainability. This can be challenging for teachers, who might have limited skills in integrating and teaching EfS (Taylor et al., 2019). Although teachers may be willing to offer effective EfS programmes, their lack of knowledge and teaching skills limit their practice (Cowie & Eames, 2004). Some teachers are also unfamiliar with EfS pedagogy (Eames et al., 2008). In addition, teachers are usually constrained by busy schedules (Timperley et al., 2007), which can limit their practice in EfS-related topics (Cowie & Eames, 2004; Robertson & Krugly-Smolka, 1997; Taylor et al., 2019). Thus, to some extent, limited EfS implementation can be due to teachers’ lack of professional learning (Bolstad et al., 2015).

Taylor et al. (2019) have argued that teachers’ professional learning is one of the main determinants of successful EfS implementation and the establishment of an effective, productive EfS programme. The need to provide support for teachers and their professional learning has also been recognised as a key condition for incorporating EfS in the overall education programme (UNESCO, 2014). However, a review of the literature has indicated a notable lack of teacher professional learning (TPL) programmes in EfS since the 1980s (Bolstad et al., 2015; Chalmers, 2011).

To improve the quality of teaching and enhance student learning and educational outcomes, professional learning has been recognised as a significant need and responsibility for teachers (Owen, 2014; Timperley et al., 2007; Van Schalkwyk et al., 2015). Effective TPL facilitates teachers’ ongoing development of their knowledge and skills which, in turn, have a significant influence on student learning and achievement (Admiraal et al., 2016; Labone & Long, 2016; Timperley et al., 2007). As highlighted in the literature, TPL is effective when it is ongoing, timely, collaborative, intensive, focused on student learning, and conjoined with teaching practice (Beach, 2012; Kuusisaari, 2014; Liu et al., 2016; Opfer & Pedder, 2011; Timperley et al., 2007).

Two main TPL approaches, formal and informal, have been identified in the literature. Formal professional learning takes place through courses, seminars, and workshops or events (Darling-Hammond et al., 2009). It has been argued that directing teachers to a specific type of formal professional learning improves their teaching practice (Grigg et al., 2012) because such learning offers teachers new knowledge, skills, ideas, and teaching approaches (Timperley et al., 2007). However, it is also claimed that formal methods, such as short courses or one-off sessions, may not be effective in TPL (Mansfield & Thompson, 2017; Thacker, 2014), because they may be disconnected from the complexities of the classroom (Opfer & Pedder, 2011). In contrast, “informal learning is more prevalent in the workplace and potentially more effective than formal professional learning” to change teaching practice (Thacker, 2014, p. 4).

In TPL, collaboration is reported to be valuable and efficient in improving teaching practice and student outcomes (Darling-Hammond et al., 2009; Mansfield & Thompson, 2017). Collaborative TPL is described as sharing information (Mansfield & Thompson, 2017), sharing ideas (Cameron et al., 2013), and “sharing teaching practices and knowledge” (Admiraal et al., 2016, p. 291). The role of collaboration is significant in TPL because learning can be viewed as a social activity that occurs in social groups and communities (Lave & Wenger, 1991; Vygotsky, 1978).

Although collaboration is key to successful professional learning, time and distance can limit face-to-face peer collaboration (Carr & Chambers, 2006; Deluca et al., 2014; Timperley et al., 2007). For example, attending regular meetings to discuss and exchange ideas is challenging for teachers who live in different places with different teaching schedules (Mansfield & Thompson, 2017; Opfer & Pedder, 2011). Social media can overcome these challenges by providing teachers with collaborative learning and fewer limitations (Davis, 2015; Deluca et al., 2014; Trust, 2012).

Social media have been defined as technologies that help social interaction (Bryer & Zavattaro, 2011), online environments for networking and sharing information (Osborne-Gowey, 2014), and communication websites (Kapoor et al., 2018). Due to their collaborative nature, therefore, social media can be used for collaborative learning and mutual support (Greenhow et al., 2018; Meabon Bartow, 2014). If they do take advantage of social media, teachers may be willing to participate in professional learning because, in contrast with formal learning, there are fewer limitations on time and place (Anderson, 2006). Also, learning through social media is not limited to a certain area or group but enables ongoing local and global collaborative and networking opportunities (Ross et al., 2015). Teachers’ experience of social media is also associated with their emotional needs, including “meaningful connections to combat isolation” (Greenhow et al., 2018, p. 2260).

Despite global recognition of the flexibility of social media for learning in general, and TPL in particular (Bolkan, 2014; Forbes, 2015; Kabilan et al., 2011; Kuusisaari, 2014; Ross et al., 2015; Rutherford, 2013), a review of the literature suggests that, in New Zealand, there is a dearth of research addressing TPL in EfS. In responding to this situation, this study aims to understand and describe the ways in which social media facilitate TPL in EfS. The aim of the study will be addressed by answering the research question: What possibilities and advantages do EfS teachers see for TPL through social media?

Methodology and methods

The study was carried out with a mixed-methods approach and volunteer sampling outlined in three phases. An online questionnaire comprising 21 questions, including four open-ended questions, was used for the first phase. Open-ended questions were employed in the last section to enable respondents to write about whatever they regarded as relevant to TPL through social media.

The questionnaire was sent to 1000 Enviroschools (Enviroschools, 2016), was available online for 6 weeks, and received 194 responses in that time. Later, of the 194 returned questionnaires, those that included six or fewer completed questions were deleted from the data pool. As a result, the number of research participants for the statistical analysis was reduced to 176.

As already mentioned, this paper reports a portion of the findings from a wider study that captured participants’ views and data concerning their social-media use, teacher professional learning in general, teacher professional learning in EfS, and teachers’ perspectives on professional learning through social media in EfS. For this paper, however, only those questions dealing with participants’ perspectives on professional learning through social media in EfS were considered and analysed.

Quantitative data from the closed questions was transferred to the Statistical Package for Social Sciences (SPSS) for further analysis. Descriptive statistics of means and standard deviations were used to identify sample features and report the findings in a simple manner (Pallant, 2010). Qualitative data generated from open-ended questions was analysed through inductive thematic analysis (Boyatzis, 1998; Burnard et al., 2008). The qualitative data was categorised, reviewed, and interpreted in relation to the research questions (Cohen et al., 2011; Punch, 2014).

The second phase was a qualitative study based on semi-structured interviews. The types of question and interview items were constructed based on the research findings in Phase 1. Five teachers who took part in Phase 1, and agreed to participate in the second phase of the study, were interviewed to explore and clarify the findings emerging from the questionnaire. Because the interviewees lived throughout New Zealand, the interviews were carried out online and by phone, according to the participants' preferences. With participants' permission, audio recordings were made and the interviews were transcribed verbatim (Johnson & Christensen, 2012; Punch, 2014). Later, the interview transcripts were emailed to the participants for them to check the accuracy of what had been recorded and to enhance the validity of the data (Guba, 1981). Validation was valuable for rewording and clarifying some expressions and technical terms, as suggested by some of the participants. Analysing data in this phase involved categorising aspects of TPL through social media to explain findings from Phase 1 and find any patterns in the participants' perceptions.

Findings from the first and second phases informed the strategy for the TPL community through social media to facilitate synchronous and asynchronous connections and communication between teachers and experts in the third phase. For synchronous collaboration, five webinars given by EfS experts were run over the study period (November 2017 to July 2018). Topics varied but centred on EfS achievement standards. Webinars gave teachers the feeling of engagement in face-to-face interactive meetings and involvement in a community. They also provided teachers with the opportunity to put questions to the experts, to hold discussions with other teachers, and to access shared resources. For asynchronous activities, two forums, *Questions and Answers* and *Discussions*, were intended to provide teachers with opportunities to share and gain information through questions and peer discussion. Under the *Links and Resources* tab, teachers could share or find resources.

Participants in the EfS community comprised eight secondary school teachers who had indicated an interest in being part of the TPL community on Google+. Two of them had taken part in previous phases and were engaged in the third phase from the planning stage. Later, when the community was established, six more teachers joined as community members. Four teachers, however, did not actively contribute to the community's activities and did not give consent to use their data in this study. Consequently, there is no data to report in relation to them. To connect teachers with EfS experts, two experts—a Māori advisor and a moderator from the New Zealand Qualifications Authority (NZQA)—joined our community.

Data-gathering in Phase 3 mainly entailed semi-structured interviews which were supplemented with document analysis of participants' posts and activities on Google+. Analysis of teachers' posts on the Google+ community, and video capture of the webinars, provided valuable information and helped in the design of more useful questions before conducting interviews in the last step of Phase 3.

Participants in Phase 3 were four secondary school teachers who volunteered to take part in the EfS Google+ community and indicated their willingness to participate in an interview. These four teachers are identified by their chosen pseudonyms as Helen, Blake, Juno, and Bruce.

Thematic analysis was used in this phase of the study to find the themes in the data and to identify implicit and explicit ideas in participant interviews on the topics. Data was categorised with respect to the participants' perceptions of their learning through social media.

Findings

As Table 1 indicates, the gender distribution of the questionnaire respondents was not equal; 90% (157) were female and 10% (18) male. This gender distribution is in line with the data reported on 2017 teaching staff by the Ministry of Education (Ministry of Education, 2018).

Table 1 Demographic characteristics of respondents

Gender (n=175)	Frequency	Percentage
Female	157	90
Male	18	10

To identify how questionnaire participants viewed the value of social media to facilitate their professional learning in EfS, they were asked to indicate their agreement with six related statements. Participants' answers to each statement were defined as an ordinal variable from 1 (strongly disagree) to 5 (strongly agree). Table 2 presents participants' responses to those statements by calculating the mean and standard deviation for each statement.

Table 2 Participants' views regarding the use of social media for TPL in EfS

Statements on participants' views regarding the use of social media for TPL in EfS	Mean	SD
Social media can be useful for EfS teachers to provide learning support for their colleagues.	4.08	0.63
Social media can be useful for teachers' collaborative learning in EfS.	4.06	0.63
Social media can be useful for learning about the environment and sustainability.	4.05	0.65
Social media can help to build a professional learning network of EfS teachers.	4.03	0.67
Social media can help EfS teachers feel less isolated in their work.	3.77	0.73
EfS teachers should be using social media for their learning today.	3.42	0.83

As shown in the table, participants consistently agreed with the statements regarding teacher professional learning through social media in EfS.

To provide an overview of Phase 1 participants' perceptions regarding the potential use of social media for TPL, these individuals were asked to rate the potential of social media for TPL in EfS on a scale of 1 to 10, with 10 being the most useful. Figure 1 shows participants' responses, indicating that most (68%) rated the potential of social media for TPL in EfS to be high by selecting a number between 5 and 9. This finding is in line with the outcomes of previous studies that address learning through social media (Bexheti et al., 2014; Carpenter, 2014; Davis, 2015; Holmes et al., 2013; Ross et al., 2015; Trust et al., 2016).

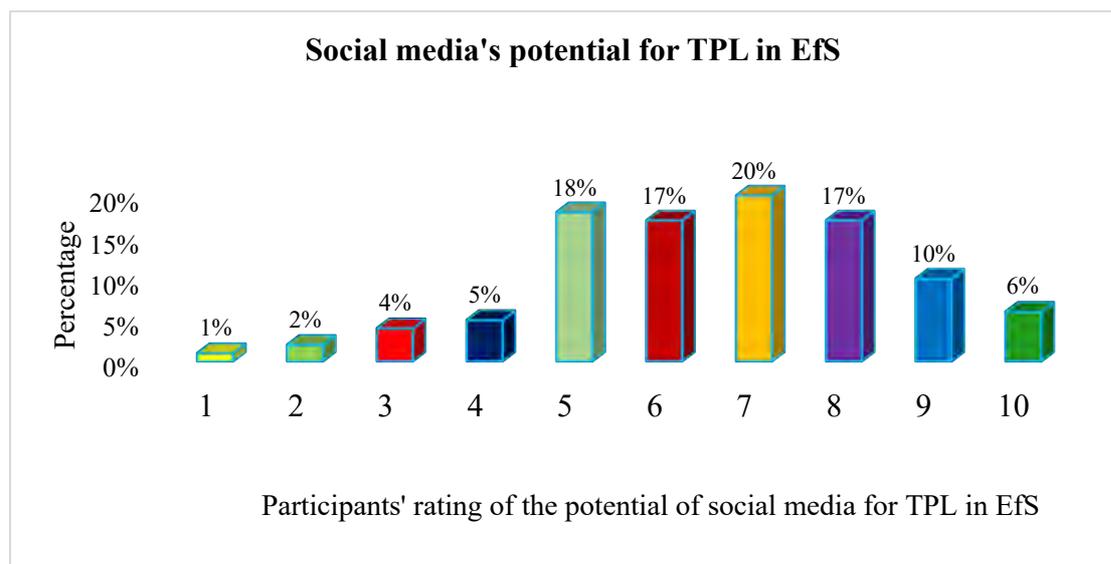


Figure 1 Participants' perceptions regarding the potential of social media for TPL in EfS

Furthermore, a large percentage of Phase 1 participants stated that they would probably join a social-media network for EfS if such a network for teachers were available (80.5% of Phase 1 participants).

Participants' responses to open-ended questions suggested several advantages and possibilities for learning through social media. Because responses did not include any quantities or measurable data, common themes were derived from their comments. Open-ended questions gave me an opportunity to explore some themes in greater depth. The following section shows the main themes as they were perceived and described by participants. The participants are identified by the letter "T," followed by a number from T1 to T135.

Findings from open-ended questions showed that flexibility was seen to be an important factor in professional learning through social media. One participant described TPL through social media as "on-demand and accessible for teachers when they need it" (T113). Through social media, teachers have "easy access to resources and support based on their priorities and interests at any time, from anywhere" (T113). Another teacher wrote: "Because I live and work in an isolated area, I would be able to access learning in EfS without having to travel long distances" (T164). Phase 2 interviewees shared the same view; one remarked that "professional learning involves too much travel for me because I'm out in the country" (Interviewee 2, interview Phase 2) and "learning through social media is just timely and you do not have to go anywhere". Through recourse to social media, "if a teacher has any questions whatsoever regarding sustainability, the answers can be found quickly and easily" (T23). A teacher commented on the questionnaire: "Learning through social media can be great and useful. You can do it anytime you would like to do it" (T63). These findings confirm previous findings in the literature (Davis, 2015; Greenhow et al., 2018; Ross et al., 2015; Trust et al., 2016).

Questionnaire participants believed that collaboration through social media would enable them to access support, resources, and updates (133/135 times in the open-ended responses). Collaboration involves direct assistance from colleagues to "provide aids and/or materials for teaching" (T144), as well as "sharing experiences and knowledge" (T38) in teaching EfS. It also affords indirect help through "guiding teachers towards the right direction and information" (T67). To gain more insight into teachers' perceptions of accessing support through social media, Phase 2 interviewees were asked to clarify the kind of support they would be looking for. An

interviewee said: “Through social media, I would be looking for support around teaching . . . ideas, assessment schedules, and resources that have been used to deliver EfS” (Interviewee 1, interview Phase 2). Support for another interviewee also involved receiving information and material which could help in teaching EfS: “Support for me means seeing what other teachers did, and seeing their lesson plan and the term plan and how they linked to the curriculum” (Interviewee 2, interview Phase 2).

Participants also demonstrated interest in collaboration through social media to overcome isolation, due to the potential of social media to provide them with connection and communication opportunities. For example, one teacher commented on the questionnaire that “social media has the potential to decrease isolation of teachers, and keep them excited and up to date in their subject area” (T60). Another teacher commented: “Because I live and work in an isolated area, I would be able to access learning in EfS through social media” (T164).

This sentiment was also evident from the responses of Phase 2 participants. Four reported that they felt isolated because they worked in remote areas and did not have access to other teachers or experts to ask questions (Interviewees 1, 2, 3, 4, Phase 2). They acknowledged the value of social media to facilitate connection and interaction among teachers and provide them with synchronous and asynchronous collaboration and support. For example, one interviewee remarked that “I am really frustrated by lack of support as an educator, mainly because I’m teaching in a rural area”. Accordingly, she thought that “providing more opportunities for teacher education and resources for teachers through social media would be a good thing to improve EfS” (Interviewee 1, interview Phase 2). She also praised the potential for social media to facilitate emotional support for isolated teachers.

To trial these findings and obtain a better understanding of teachers’ perceptions, the study continued into the third phase. Findings from previous phases were employed to establish a learning community for teachers who were engaged in EfS Achievement Standards¹ through Google+. Although teachers had shown interest and enthusiasm about joining a social-media network for TPL in EfS in the first and second phases of the study, the community did not attract many members. Only four teachers who worked in rural areas, or had no community of like-minded educators in their school, joined the learning community on Google+ and engaged in community activities. As the following description reveals, all of these teachers—Blake, Bruce, Juno, and Helen—had limited or no face-to-face support and learning opportunities.

Blake was a secondary-school teacher in a remote area. He described his motivation for joining the community as “meeting other educators,” including EfS experts and teachers, and he wanted to collaborate with others who were teaching the EfS standards (Blake, interview Phase 3). For Blake, the community provided opportunities to meet others and share ideas about teaching EfS standards.

Bruce was a young teacher, teaching science, biology, and sport in a school with a traditional education system. He was the only teacher in his school who engaged with the EfS Achievement Standards. To plan and set up the EfS programme for next year, Bruce needed support and ideas from others, and this motivated him to join the EfS community. He found it useful to collaborate with others through this community.

Juno was a science teacher at a small school and joined the EfS community in the hope that this initiative would produce solutions regarding the “use of social media and to make contact with a network of EfS teachers involved in EfS” (Juno, Google+). Juno’s motivation for joining the

¹ Education for Sustainability subject resources <https://www.nzqa.govt.nz/ncea/subjects/education-for-sustainability/levels/>

community was to collaborate with EfS experts, share contacts with anyone who needed advice, look for collaborators, and bring more teachers into the community. Considering the limited number of teachers engaged with the EfS Standards, he was interested in using social media for collaboration, as he believed this was a way for teachers to work together.

Helen was also teaching in a remote area, and was motivated to join the community to collaborate with EfS experts and teachers and develop wider connections. She believed that, while face-to-face collaboration is limited by time and place, social media can facilitate TPL in EfS.

Despite the limited number of members, the community was used by participants for collaborative learning with other teachers and experts. Findings from document analysis indicated that the Google+ community enabled them to share and gain ideas and information, and access resources. Participants joined both synchronous and asynchronous activities, such as webinars, discussion forums and question and answer forums. Participants also shared resources, such as Achievement Standards levels 2 and 3, samples of student work, and marking rubrics for Achievement Standards levels 2 and 3.

Findings from Phase 3 interviews were in line with previous findings in Phases 1 and 2. Interviews showed that interaction with EfS teachers and experts was one of the satisfying features of the EfS Google+ community. Participants indicated that synchronous interaction with other members and experts and asynchronous support from other teachers were valuable, and that interactive activities, such as the webinars, questions and discussions, as well as sharing resources and feedback, were beneficial for them. This finding was consistent with the study conducted by Trust et al. (2016) on professional learning networks for teachers—in both contexts it could be seen that teachers use social media to collaborate as a way to overcome isolation. These findings are also consistent with a study by Davis (2015), which indicates that social media can support teachers who do not have access to face-to-face collaboration and other support opportunities.

In line with the study by Greenhow et al. (2018), participants in the current study were convinced that social media has significant value for TPL in EfS to provide peer support and collaboration opportunities. Phase 3 interviewees clearly expressed their appreciation of support as an aspect of collaboration through the EfS community. For Bruce, support meant “knowing that if I have any questions or I need help, people [the community’s members] are there who have done it before and they would help me out” (Bruce, interview Phase 3). Support was mentioned by Helen as providing the opportunity to ask questions and give access to resources. As she explained, “in the absence of Ministry [of Education] support, you can easily get to an expert (through the EfS community) to answer your questions” (Helen, interview Phase 3). For Helen, support also meant access to resources and material which could help in teaching and assessing EfS. Juno joined the EfS Google+ community hoping to gain access to resources when needed and found “shared resources regarding Standards 2.1 and 3.1 quite useful” (Juno, interview Phase 3). Participants saw the value of synchronous interaction and asynchronous support from other teachers and experts through social media. The same values were identified in previous studies addressing social media for learning (Carpenter, 2014; Davis, 2015; Holmes et al., 2013; Ross et al., 2015; Trust et al., 2016)

In interviews that asked participants about their satisfaction with the community’s activities, all four interviewees affirmed that, through the webinars, they were satisfied with synchronous interactions with other members, including EfS experts. For Juno, taking part in the webinars provided an “opportunity to have a face-to-face discussion with EfS experts.” He opined that when “teachers have many questions, it makes more sense to ask directly through a webinar rather than sending emails” (Juno, interview Phase 3). Helen praised webinars for making it

possible to meet other community members in the absence of the opportunity to meet them in person. “The webinars were great,” she said, “because you feel that you have met a person. Meeting somebody (EfS teachers or experts) in person is obviously ideal but webinars were good, second best if you like” (Helen, interview Phase 3). “We are teaching very much in isolation,” she continued. She endorsed webinars as a method to collaborate with others, particularly teachers and experts. Similar findings were reported in a study by McConnell et al. (2012). As discussed in his study, establishing a sense of community was an important element to encourage discussion and communication in online communities. In this regard, they recommended online videoconferencing as a useful way to develop a sense of being part of a group.

As mentioned earlier, four of the five Phase 2 interviewees and all Phase 3 interviewees were working in remote areas or small schools. They felt isolated due to limited face-to-face support and learning opportunities. It was evident from this study, particularly from Phase 3 findings, that social media can be used to facilitate TPL in EfS by connecting teachers and providing them with resources and the possibility of interacting with others. Findings from this study confirm that social media can provide support for teachers who do not have access to face-to-face collaboration and support opportunities (Davis, 2015).

Conclusion

The main conclusion to be drawn from this study is that EfS teachers understand the potential of social media to facilitate connection and provide collaborative learning experiences. Social media were endorsed by teachers as a means of providing them with a sense of being part of a learning community from which they could receive intellectual and emotional support to overcome isolation. Building connections between teachers and facilitating synchronous and asynchronous interaction can help them interact with peers and experts as well as access support and resources. Flexibility was seen to be an important element of learning through social media. Participants stated that social media gave them easy access to resources and support, based on their own priorities and interests at any time and in any place.

Findings from this study showed that while flexibility is an important feature of TPL, using social media for professional learning is particularly attractive for teachers who work in rural areas. The results of this research demonstrated that TPL for teachers who work in such areas requires creating flexible learning environments that allow teachers to connect with colleagues and experts. This study confirms the view that social media has significant value for TPL in EfS and provides peer support and collaboration opportunities for teachers in general. The study also endorses the understanding that social media has significant value in remote areas where EfS finds less support, because of the potential for facilitating TPL and overcoming teacher isolation.

Limitations of the study

This study focused on how teachers perceive the flexibility of social media. It did not investigate the possible challenges for participants in using social media in TPL. The study was also limited by dependence on the participation of volunteers and self-reported data. Consequently, it is possible that these participants had a greater commitment to, and interest in, professional learning through social media than other teachers. In addition, the study was limited by the number of participants who volunteered to participate in Phases 2 and 3.

This research was confined to the context of TPL in EfS and data was gathered from EnviroSchools teachers in New Zealand. Consequently, some of the findings might not reflect the opinion of teachers in general schools in New Zealand.

References

- Admiraal, W., Kruijer, J., Lockhorst, D., Schenke, W., Sligte, H., Smit, B., Tigelaar, D., & De Wit, W. (2016). Affordances of teacher professional learning in secondary schools. *Studies in Continuing Education*, 38(3), 281–298. <https://doi.org/10.1080/0158037X.2015.1114469>
- Anderson, T. (2006). Higher education evolution: Individual freedom afforded by educational social software. In M. F. Beaudoin (Ed.), *Perspectives on higher education in the digital age* (pp. 77–90). Nova Science.
- Beach, R. (2012). Can online learning communities foster professional development? *Language Arts*, 89(4), 256–262. <https://doi.org/https://search.proquest.com/docview/928760706?pq-origsite=gscholar>
- Bexheti, L. A., Ismaili, B. E., & Cico, B. H. (2014, September). *An analysis of social media usage in teaching and learning: The case of SEEU*. International Conference on Circuits, Systems, Signal Processing, Communications and Computers. Saint Petersburg, Russia. <http://www.inase.org/library/2014/>
- Bolkan, J. (2014). Most teachers use social media, worry it will cause conflict. *THE Journal*. <https://thejournal.com/articles/2014/01/15/report-most-teachers-use-social-media-worry-it-will-cause-conflict.aspx>
- Bolstad, R. (2005). Environmental education: A place in the curriculum? *New Zealand Annual Review of Education*, 14, 215–235.
- Bolstad, R., Joyce, C., & Hipkins, R. (2015). *Environmental education in New Zealand schools: Research update 2015*. Ministry of Education.
- Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. SAGE.
- Bryer, T. A., & Zavattaro, S. M. (2011). Social media and public administration: Theoretical dimensions and introduction to the symposium. *Administrative Theory & Praxis*, 33(3), 325–340.
- Burnard, P., Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Analysing and presenting qualitative data. *British Dental Journal*, 204(8), 429–432. <https://doi.org/10.1038/sj.bdj.2008.292>
- Cameron, S., Mulholland, J., & Branson, C. (2013). Professional learning in the lives of teachers: Towards a new framework for conceptualising teacher learning. *Asia-Pacific Journal of Teacher Education*, 41(4), 377–397. <https://doi.org/10.1080/1359866x.2013.838620>
- Carpenter, J. P. (2014). Twitter's capacity to support collaborative learning. *International Journal of Social Media and Interactive Learning Environments*, 2(2), 103–118.
- Carr, N., & Chambers, D. P. (2006). Teacher professional learning in an online community: The experiences of the National Quality Schooling Framework Pilot Project. *Technology, Pedagogy and Education*, 15(2), 143–157.
- Chalmers, J. (2011). *Education for sustainability: An investigation of teachers' and students' perceptions and experiences* [Master of Education (MEd), University of Waikato]. Hamilton, New Zealand. <https://researchcommons.waikato.ac.nz/handle/10289/5957>
- Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education*. Routledge.

- Cowie, B., & Eames, C. (2004). Environmental education in New Zealand schools: Challenges for sustainability. *Set: Research Information for Teachers*, 3, 19–23.
- Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the US and abroad*. National Staff Development Council.
- Davis, K. (2015). Teachers' perceptions of Twitter for professional development. *Disability and Rehabilitation*, 37(17), 1551–1558. <https://doi.org/10.3109/09638288.2015.1052576>
- Deluca, C., Shulha, J., Luhanga, U., Shulha, L. M., Christou, T. M., & Klinger, D. A. (2014). Collaborative inquiry as a professional learning structure for educators: A scoping review. *Professional Development in Education*, 41(4), 1–31. <https://doi.org/10.1080/19415257.2014.933120>
- Eames, C. (2010). *Education for sustainability in New Zealand schools. Part two—Report on the Enviroschools Programme*. Ministry of Education New Zealand.
- Eames, C., Cowie, B., & Bolstad, R. (2008). An evaluation of characteristics of environmental education practice in New Zealand schools. *Environmental Education Research*, 14(1), 35–51.
- Enviroschools. (2016). *Enviroschools*. <http://www.enviroschools.org.nz>
- Forbes, D. (2015). *Building connections: Professional online presence and learning networks* Proceedings of the 2nd European Conference on Social Media, Porto, Portugal. <http://researchcommons.waikato.ac.nz/handle/10289/9473>
- Greenhow, C., Campbell, D., Galvin, S., & Askari, E. (2018). *Social media in teacher professional development: A literature review*. Society for Information Technology & Teacher Education International Conference, Washington, DC.
- Grigg, J., Kelly, K. A., Gamoran, A., & Borman, G. D. (2012). Effects of two scientific inquiry professional development interventions on teaching practice. *Educational Evaluation and Policy Analysis*, 35(1), 38–56. <https://doi.org/10.3102/0162373712461851>
- Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Communication and Technology: A Journal of Theory, Research, and Development*, 29(2), 75–91.
- Holmes, K., Preston, G., Shaw, K., & Buchanan, R. (2013). Follow me: Networked professional learning for teachers. *Australian Journal of Teacher Education*, 38(12), 55–65.
- Johnson, B., & Christensen, L. B. (2012). *Educational research: Quantitative, qualitative, and mixed approaches* (Vol. 4). SAGE.
- Kabilan, M. K., Adlina, W. F. W., & Embi, M. A. (2011). Online collaboration of English language teachers for meaningful professional development experiences. *English Teaching: Practice and Critique*, 10(4), 94–115.
- Kapoor, K. K., Tamilmani, K., Rana, N. P., Patil, P., Dwivedi, Y. K., & Nerur, S. (2018). Advances in social media research: Past, present and future. *Information Systems Frontiers*, 20(3), 531–558.

- Kuusisaari, H. (2014). Teachers at the zone of proximal development: Collaboration promoting or hindering the development process. *Teaching and Teacher Education, 43*, 46–57. <https://doi.org/10.1016/j.tate.2014.06.001>
- Labone, E., & Long, J. (2016). Features of effective professional learning: A case study of the implementation of a system-based professional learning model. *Professional Development in Education, 42*(1), 54–77.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Liu, K., Miller, R., & Jahng, K. E. (2016). Participatory media for teacher professional development: Toward a self-sustainable and democratic community of practice. *Educational Review, 1*–24. <https://www.tandfonline.com/doi/full/10.1080/00131911.2015.1121862>
- Mansfield, C., & Thompson, G. (2017). The value of collaborative rounds for teacher professional learning in Australia. *Professional Development in Education, 43*(4), 666–684. <https://doi.org/10.1080/19415257.2016.1216883>
- McConnell, T. J., Parker, J. M., Eberhardt, J., Koehler, M. J., & Lundeberg, M. A. (2012). Virtual professional learning communities: Teachers' perceptions of virtual versus face-to-face professional development. *Journal of Science Education and Technology, 22*(3), 267–277. <https://doi.org/10.1007/s10956-012-9391-y>
- Meabon Bartow, S. (2014). Teaching with social media: Disrupting present day public education. *Educational Studies, 50*(1), 36–64. <https://doi.org/10.1080/00131946.2013.866954>
- Ministry of Education. (2007). *The New Zealand curriculum*. Wellington, New Zealand: Learning Media.
- Ministry of Education. (2016). *Education for sustainability*. <http://nzcurriculum.tki.org.nz/Curriculum-resources/Education-for-sustainability>
- Ministry of Education. (2018). *Teaching staff*. https://www.educationcounts.govt.nz/statistics/schooling/teaching_staff
- Opfer, V. D., & Pedder, D. (2011). Conceptualizing teacher professional learning. *Review of Educational Research, 81*(3), 376–407. <https://doi.org/10.3102/0034654311413609>
- Osborne-Gowey, J. (2014). What is social media. *Fisheries, 39*(2), 55–55. <https://doi.org/10.1080/03632415.2014.876883>
- Owen, S. (2014). Teacher professional learning communities: Going beyond contrived collegiality toward challenging debate and collegial learning and professional growth. *Australian Journal of Adult Learning, 54*(2), 54–77. <https://doi.org/https://eric.ed.gov/?id=EJ1033925>
- Pallant, J. (2010). *SPSS survival manual: A step by step guide to data analysis using SPSS*. Open University Press.
- Punch, K. F. (2014). *Introduction to social research: Quantitative and qualitative approaches* (3rd ed.). SAGE.
- Robertson, C. L., & Krugly-Smolka, E. (1997). Gaps between advocated practices and teaching realities in environmental education. *Environmental Education Research, 3*(3), 311–326.

- Ross, C. R., Maninger, R. M., LaPrairie, K. N., & Sullivan, S. (2015). The use of Twitter in the creation of educational professional learning opportunities. *Administrative Issues Journal: Connecting Education, Practice, and Research*, 5(1), 55–76.
<https://doi.org/10.5929/2015.5.1.7>
- Rutherford, C. (2013). Facebook as a source of informal teacher professional development. *In Education*, 16(1), 60–74. <https://doi.org/https://ourspace.uregina.ca/handle/10294/3101>
- Taylor, N., Quinn, F., Jenkins, K., Miller-Brown, H., Rizk, N., Prodromou, T., Serow, P., & Taylor, S. (2019). Education for sustainability in the secondary sector: A review. *Journal of Education for Sustainable Development*, 13(1), 102–122.
- Thacker, E. S. (2014). *Smooth sailing through stormy seas? High school social studies teachers navigating their informal professional learning* [Doctoral dissertation, University of Kentucky]. Lexington, KY.
- Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration (BES)*. Ministry of Education.
- Trust, T. (2012). Professional learning networks designed for teacher learning. *Digital Learning in Teacher Education*, 28(4), 133–138. <https://doi.org/10.1080/21532974.2012.10784693>
- Trust, T., Krutka, D. G., & Carpenter, J. P. (2016). “Together we are better”: Professional learning networks for teachers. *Computers & Education*, 102, 15–34.
<https://doi.org/10.1016/j.compedu.2016.06.007>
- UNESCO. (2014). *UNESCO education strategy 2014–2021*. <http://unesdoc.unesco.org>
- Van Schalkwyk, S., Leibowitz, B., Herman, N., & Farmer, J. (2015). Reflections on professional learning: Choices, context and culture. *Studies in Educational Evaluation*, 46, 4–10.
<https://doi.org/10.1016/j.stueduc.2015.03.002>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher mental process*. Harvard University Press.

Biographical notes

Fariba Mostafa
fariba.mostafa@waikato.ac.nz

Fariba is a senior tutor at Waikato University College. She has been engaged with sustainability throughout her life, as a teacher, student, and researcher. Reflecting on her experience as a teacher and her PhD findings, she has started to establish and develop a professional collaborative learning community for college teachers.

Mostafa, F. (2021). Social media: A flexible collaborative learning space for teacher professional learning to integrate education for sustainability in schools. *Journal of Open, Flexible and Distance Learning*, 25(1), [32–44].



This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License](https://creativecommons.org/licenses/by-nc-nd/3.0/).