

Empowering Teachers' Professional Growth: Harnessing Smartphones for Collaboration, Self-monitoring, and Learning

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Abstract

The growing use of smartphones in daily communications has emerged as a dynamic device in terms of storing information, searching online materials, and disseminating ideas. The technology has the potential to enhance teachers' instructional activities. This study presents an analysis of secondary teachers' use of smartphones in their professional development. Twelve teachers were purposely selected to participate in this case study. The data collected through the semi-structured interviews and participant observation were thematically analysed. The study found that although teachers were not compelled to use digital technology in their professional activities, they used smartphones to update their professional knowledge and skills, monitor their performance, and seek support from other teachers by networking and collaborating. The findings indicate that the use of smartphones in instructional activities did not transform their traditional pedagogies. However, teachers harnessed their smartphones as educational technology for professional development, particularly in learning subject

matter and monitoring self performance and problem solving by networking and collaborating with teachers because of the perceived usefulness and ease of use of the technology. Researchers, teacher trainers, teachers, and policymakers need to reconsider the benefits of the educational use of smartphones in teachers' professional development as has given its presence in the personal and professional lives of teachers.

Keywords: mobile devices, teachers' development, qualitative, collaboration, problem solving

Introduction

In the two decades of the twenty-first century, smartphones have become the most common digital devices for people. These devices are widely used across various educational contexts worldwide (Nazari & Xodabande, 2020). The outbreak of COVID-19 further accelerated the

educational use of mobile devices worldwide. Understanding teachers' use of smartphones in their educational practices has been a contemporary issue in the broader context of ICT integration because teachers use technology to enhance their content knowledge and pedagogy skills (Heitink et al., 2016). Developing content knowledge and pedagogical skills are inseparable components of teachers' continuous professional development.

The attraction to portable handheld mobile devices among educators is ever-increasing. Growing numbers of teachers were attracted to smartphones for learning in the first decade of the twenty-first century (Baran, 2014), and this has continued in the second and third decades of this century. Scholars have studied the use of mobile devices for teachers' professional development (Ekanayake & Wishart, 2015; Mouza & Barrett-Greenly, 2015; Nazari & Xodabande, 2020). For example, Ekanayake and Wishart (2015) found that professional development training on using mobile devices changed teachers' attitudes toward the potential these devices have in teaching and learning among Science teachers in Sri Lanka. Similarly, Nazari and Xodabande (2020) found that professional development courses on mobile learning increased teachers' ability to use mobile devices for pedagogical purposes. Manyeredzi and Mpofo (2022) found that teachers in Zimbabwe were ready to embrace smartphones when they were made aware of their use in pedagogy. These studies indicate that smartphones can support teachers in using modern digital tools for pedagogical practices.

I have been using smartphones to enhance my professional development since my first smartphone in 2008. However, I found little evidence in the literature of smartphone use by other teachers in Nepal. I thought other interested teachers could learn from the experiences of those teachers using their smartphones for learning. I started exploring the use of mobile devices in teacher learning before Covid-19. I noticed that teacher's use of smartphones accelerated after the outbreak of Covid-19. As a teacher, I observed that my colleagues started to use these devices for educational purposes. The government of Nepal asked teachers to support students with alternative learning, including virtual learning, during the outbreak of COVID-19 (Ministry of Education Science and Technology, 2020). As a result, the smartphone was recognised as an e-learning tool.

People use smartphones primarily for communication, banking, and business. A few researchers have studied the educational use of mobile phones in rural contexts (Parajuli, 2016; Shrestha, 2011; Shrestha, 2016). The educational policy of the government of Nepal recognises ICT as a teaching-learning tool (Ministry of Communication and Information Technology, 2019). Smartphones have become common ICT tools in Nepal. The present study explored secondary teachers' use of smartphones for their professional development activities in semi-urban areas of Nepal, where traditional desktop-based ICT facilities are not readily available because of the low availability of stable electricity and internet services and high cost (Rana, 2018). I adopted a case study research design to answer the question: How do secondary teachers use their smartphones for professional development? More specifically, I tried to answer: (1) How did they use their smartphones to develop their subject knowledge? (2) How did they use these devices to enhance teaching learning skills? (3) How did they use these devices to network and collaborate with other teachers?

I used the Technology Acceptance Model (TAM) as a theoretical framework in this study. Most of the research on technology adoption in education with this theoretical framework have been conducted in developed countries. There are very few studies conducted with TAM in Nepal

(Teo et al., 2019). The available studies have been conducted in urban areas. Based in semi-urban areas in the Himalayan District, this study has the potential to contribute to the understanding of the usability of smartphones to empower teachers working in the underprivileged areas of the country. The stakeholders may use the findings of this study to gain insights into the creative use of smartphones to enhance their professional development more effectively in the post-COVID-19 era.

Review of Literature

Smartphones, the most popular digital devices worldwide, have been extensively used in various sectors such as communication, entertainment, commerce, banking, and education. The literature on mobile learning is rapidly growing. The use of smartphones in teachers' professional development is reviewed in this section.

Technology Acceptance Model (TAM) as a Theoretical Framework

This study is based on the Technology Acceptance Model (TAM), initially proposed by Davis (1989). TAM explains the factors that determine the users' acceptance of computer technology. Davis proposed that the perceived usefulness (PU) of the technology and perceived ease of use (PEOU) of the technology are critical factors for determining the acceptance of the technology. This model is adopted in this study because the use of smartphones for teacher's professional development is based on the acceptance and use of smartphones as an emerging technology in education. The constructs of this model, perceived usefulness and ease of use, provide a framework for explaining teachers' selection of devices for their educational purposes. This study is also based on a reconceptualization of learning in a digital age, which claims that mobile learning is different from traditional classroom-based learning because it demands active roles of learners in virtual communities, as proposed by Sharples et al. (2005). They claimed that new learning is personalized, networked, and situated in the daily lives of the learners.

Smartphone as E-learning Technology

Digital natives use smartphones because these devices have the capability of mobile phones and computational facilities for internet access, infotainment, learning, and other activities (Iqbal & Bhatti, 2020). Stockwell and Liu (2015) argued that the current generation of smartphones is more advantageous than earlier mobile phones designed for communication because of a large screen and onscreen keyboard for better scrolling and input methods. Crompton (2013) argued that mobile devices provide ideal affordances for learner-centric pedagogical practices because mobile devices have overcome the earlier limitations of power, functionality, speed, memory, and screen sizes.

Researchers have reported successful educational use of smartphones in education despite some distractions. Anshari et al. (2017) found that Brunei students used their smartphones to access learning resources from the internet and argued that entertainment apps such as videos and games on smartphones might distract students from their learning activities. However, they argued that the possible distraction caused by smartphones in classes could be minimised by making proper guidelines for their use. In their study in Iran, Nushi and Egbali (2017) found that Duolingo, a language-learning mobile app, was effective for foreign language learning despite some challenges. Similarly, Loewen et al. (2019) found a positive correlation between time spent on the Duolingo app and foreign learning among graduate students in the USA. Hamm et al. (2014) argued that smartphones enhanced learners' engagement in their learning by allowing them to take courses beyond the classroom, communicate

with teachers outside school time, and associate learning with daily life. Iqbal and Bhatti (2020) argued that smartphones are practical tools for educational purposes.

Smartphones have been gradually accepted as educational tools. Ismail et al. (2013) reported that restricting students from using smartphones at school discouraged teachers from teaching with mobile devices in class in Malaysia. In a study in South Korea, Cha and Seo (2018) found that one-third of adolescents were addicted to their smartphones. However, Tilton and Hartnett (2016) argued that cooperation between teachers and students plays a vital role in effectively using digital tools in the classroom. The changing landscape of digital technology shows that mobile devices can be used in education despite certain constraints. The constant connection and multiple features and applications of mobile devices can enable teachers and students to develop their technological knowledge and skills for e-learning.

Smartphones in In-service Teacher Training

The use of smartphones in teachers' education has been studied across different countries. For example, Hikmat and Mulyono (2018), in Indonesia, found that preservice teachers used their smartphones for multitasking (doing different activities such as texting and searching simultaneously), which helped them to be independent learners. However, they argued that it distracted their learning by dividing their focus into various learning activities. Gloria and Oluwadara (2016) found that Social Studies teachers became more efficient in using mobile devices after initial training in Nigeria. In the UK, Camilleri and Camilleri (2017) found that novice teachers had more positive attitudes towards effective mobile learning but needed continuous professional development support. Becker et al. (2020) found that mobile devices were an effective digital tool for analysing video motion in the experiment for teaching physics in Germany. Similarly, Maketo (2018) identified resource management and teachers' professional development as major issues in the successful implementation of mobile technology in Nigeria. In their study in Korea, Baek et al. (2017) found that gender and experiences significantly affected teachers' attitudes toward mobile technology use in education. These studies indicated that the contextual factors of teaching and learning largely shape the use of smartphones in education.

Teachers' Self-initiated Use of Smartphone

Teachers use smartphones in several ways. Mobile devices can allow teachers to reflect on their activities in real time in their classes (Aubusson et al., 2009). Gorozidis et al. (2020) found that physical education teachers in Greece used their smartphones to access training content delivered through Facebook. Baek et al. (2017) found that South Korean teachers were generally less interested in mobile learning. In Turkey, Oz (2014) reported that prospective teachers were enthusiastic about using mobile devices for teaching and learning despite administrative rules, the limited capability of devices, lack of training, and financial restrictions. In Indonesia, Yusri et al. (2015) found that, although teachers did not have adequate knowledge of mobile learning, they had a positive perception of mobile learning and showed a willingness to learn with mobile technology.

The literature review shows that the educational use of mobile devices in general and smartphones, in particular, has drawn the attention of researchers in many countries. However, I found very little evidence of using smartphones for teacher's development in the semi-urban context of a developing country like Nepal. This study aimed to contribute to the literature on using smartphones to empower teachers in the context of semiurban areas where traditional e-learning technology is

unavailable.

Methodology

Qualitative research is appropriate for studying lived experiences in a natural setting (Denzin & Lincoln, 2011). To explore secondary teachers' use of smartphones in their professional development, this study was designed as a qualitative case study because this approach attempts to discover and describe the daily activities of a specific group of people and the meaning they attach to these activities (Erickson, 2017, p. 96). It is an appropriate study design to understand unexplored phenomena by collecting information from multiple sources (Baxter & Jack, 2008; Yin, 2018). This case study used semi-structured interviews and participant observation to explore teachers' use of smartphones in their professional development activities (Rashid et al., 2019, p. 1).

I selected three secondary schools in a municipality to include teachers teaching in different contexts in their schools. I visited the selected secondary schools and invited the teachers to participate in the study voluntarily. Twelve secondary teachers voluntarily participated in this study. Social Studies (n=3), English (n=5), and Science teachers (n=4) were involved in this study. Three teachers were female, and the others were male. The teachers ranged from 30 to 50 years, and teaching experience ranged from 10 to 24 years. All of the teachers had master's degrees except two Social Study teachers (Asha and Mohan). These schools were purposively selected from the core, middle and outskirts of a municipality in a Himalayan district of Gandaki Province in Nepal.

The head teachers of the schools were contacted and briefed on the purpose of the study. When the head teachers allowed me to conduct a study in their schools, the participants were approached for data collection. Before the data collection, I explained the purpose of the research and answered their questions about the use of data. The data for the study were collected using semi-structured interviews and participant observation. Semi-structured interviews were used to explore the teachers' practices, which were not observable at the time of study. I interviewed each of the selected teachers in the Nepali language as they felt more comfortable in this language during the interview. The semi-structured interviews were conducted in person in the schools without interrupting their classes. The teachers were followed up by telephone and Social media such as Facebook to clarify any issues raised in the interview. The teachers' use of smartphones in their schools and virtual spaces was observed.

The audio records of the semi-structured interviews were transcribed and translated into English. The transcript and observational notes were imported into the qualitative data analysis software NVivo 10 to organise the data and to identify themes. The transcriptions were read several times before the coding to familiarise with the data set. The data were analysed following the thematic approach of qualitative data analysis as suggested by (Braun et al., 2019), which is used to categorise and organise qualitative data under specific themes identified in the data set. Inductive coding procedures were used to derive the preliminary codes on the data. The preliminary codes were refined and grouped into emerging themes following six-phased thematic coding (Braun & Clarke, 2006). The three emergent themes were related to research questions and relevant literature and presented thematically. Interview excerpts were used to illustrate the issue raised by the participants. To establish the truthfulness of the data, I compared the data found in the interviews with my observation of their mobile phones and their

presence in the virtual forum. I contacted the participants to confirm that I accurately interpreted their professional development practices with my translation of the interviews. Pseudonyms identified the participants and the schools to maintain their anonymity in reporting the study findings.

Results

The study found that all participants had used their smartphones for their professional activities in addition to their regular communication and entertainment activities in their personal lives. Three significant themes emerged from the data analysis: learning tools, self-monitoring tools, and collaboration tools.

Learning Tools

The analysis of the interview transcripts and observational notes showed that the participants used their smartphones as learning tools. I found that the majority of participants were able to search subject matter on the internet and read that on their mobile devices to update their knowledge needed for teaching and learning in their classes. Most of them had downloaded reading resources on their mobile. During the interviews, they revealed how they used various resources from the internet. For example, Sunita said:

While I need to teach essay writing, I search for similar essays on the internet on my laptop or smartphone. I learn new ways of writing topic sentences from these essays. I prefer to search on the internet rather than in reference books because the internet provides a wider range of topics than my reference books. (Sunita, English teacher, Shrinagar School)

I teach biology. I do not recognize many trees presented in the textbook. I search the photos of those trees on the internet. The pictures help me a lot to understand the varieties of the trees. (Mahesh, Science teacher, Nabin School)

Their comments indicated that mobile devices allowed them to surf the internet and search for information from multiple websites. Moreover, some participants developed their language skills and teaching skills using their mobile devices. For example,

I search for a good speech at an election campaign on the internet. I also watch a talk programme at a renowned university. I watch TED talk to improve my English-speaking skills. (Kumar, English teacher, Munamadan School)

I have joined the Teacher Diary group. I watched a video lesson posted there. One teacher taught the name of months by singing. I enjoyed the video. I learned how rhythm can be taught from the teachers' discussion forum. I learned a song and practised in my class with my students on my smartphone. (Sophy, English teacher, Shrinagar School)

The participants comments indicated that PU and PEOU of smartphone helped them to adopt this technology as a learning tool. Learning from freely available online videos and developing social skills through self-initiated professional learning shows PU and PEOU of this technology. Participants' learning practices indicated that teachers would accept smartphones if they could access useful digital resources on the internet with devices effortlessly.

Self-monitoring Tool

Self-monitoring is one of the professional development activities (Richards & Farrell, 2005). Teachers shared their stories of how they utilised the recording features of smartphones for self-monitoring in the interviews. They showed their video recordings at the time of our interviews and I

observed how they utilized the smart devices in their professional development activities. They revealed that they usually recorded various events including their classroom activities for self-monitoring their teaching skills though they did not use the technology regularly. For example,

I have recorded my classes on my smartphone. I have backed up those recordings on my laptop. I made the recordings to review my presentation. I also record the students' group work in the class to show their performance later and to provide feedback (Prem, English teacher, Munamadan School)

I had recorded my 10-15 classes with my mobile. I used them for improving my English language and presentation skills. I record and share with other teachers if I do well. (Madan, English teacher, Nabin School).

After the outbreak of COVID-19, I observed that Prem, an English teacher from Munamadan School, posted his teaching videos on teachers' virtual groups and requested feedback from his colleagues. Two other teachers showed interest in recording their classes. For example,

I haven't recorded my class yet. But I will record short teaching videos soon. I think the main advantage of recording is I can get feedback in my teaching. (Narayan, Science teacher, Munamadan School)

I had recorded some of my classes but I did not save them. I will make some video lessons and save them on YouTube for my students. (Sunita, English teacher, Shrinagar School)

User-friendly design and multiple functions are the essence of modern smartphones. This study found that smartphones empowered the participants to meet the changing requirements of the teaching and learning situations. The participants were able to use audio recording and video camera features of their smartphones to make teaching and learning videos for online class and to self-monitor their performances to improve their teaching because smartphones are useful and easy tools to make audio-visual materials. This indicated that the participants accepted their smartphones for self-monitoring and improvement because PEOU and PU are associated with smartphones.

Collaboration Tool

Smartphones are very powerful tools for collaboration with their communication and file-sharing, cloud computing features. The participants shared how they used their smartphones for problem-solving and sharing teaching and learning resources. In particular, mobile communication allowed them to collaborate with their colleagues and to fix internet issues, explore learning materials in online sources, and help each other with innovative activities. Thus, PU and POEU were a driving force for using smartphones for collaboration. The participants' comments provided evidence of collaboration through their smartphones. For example,

We have a virtual group of 17-18 classmates from my university. We are scattered throughout the country, but we stay connected on Messenger. We share our problems of teaching and learning and find a solution with the help of this group. Besides discussing the problem on a virtual network, I also contact senior teachers or subject experts. I sometimes email problems or send a text message and get their support (Sunita, English teacher, Shrinagar School)

I use email to communicate with other teachers in my virtual group of Science teachers because it is easier to maintain privacy. I have joined the Facebook page of Science teachers. Some teachers post their questions either in text or pictures and request solutions. Some friends

answer those questions in their discussion posts. One week ago, one of the Science teachers asked me about the smallest periodic table. I searched for the answer on Google and shared it with him. (Suman, Science teacher, Shrinagar School)

Their expressions reflected their awareness of the potential of mobile devices. Teachers' self-initiated virtual community of learning would have been a productive source for learning new ideas, getting solutions to content issues, and offering knowledge to colleagues.

Some of the teachers involved in this study shared their experiences of improving technical skills and learning to use the internet facilities. For example,

I used to call the senior Social Studies teachers in our district when I needed clear ideas for some lessons. Now I search for the answer on Google. I also seek support from other teachers in my school. (Pramila, Social Studies teacher, Munamadan School)

I have a series of Grammar books. I also have books of literature and a glossary of literature. If I cannot find a solution in the books, I search on Google. If I still cannot find a solution, I consult with senior teachers or other teachers in school. I also contact teachers outside this school. I email them (Madan, English teacher, Nabin School)

The participants comments indicated that smartphones enabled them to connect with other professionals and share resources and solve problems. Smartphones have dedicated applications for group communication and file sharing. Users can easily connect and collaborate with several other users synchronously or asynchronously. Thus, collaboration with other professionals is one of the driving factors for the acceptance of smartphones.

Discussion

This study was conducted to find out how secondary teachers use their digital technology for their professional development activities in semi-urban areas of Nepal where traditional desktop-based e-learning facilities were not available because of a lack of devices, electricity disruptions, and unstable internet connections. The study found that participants used their smart mobile devices in their professional development activities mainly in three ways: as content and skill development tools, collaboration tools and self-monitoring tools. They used these devices to learn the subject matter they needed to teach and learn the pedagogical skills by watching videos of other teachers. Some teachers recorded their classes on these devices and monitored their performance to eliminate their weaknesses and build up on their strengths. In the same vein, they built a virtual learning community of teachers, shared teaching-learning resources and took part in professional development opportunities.

These practices indicate that the teachers working in the semiurban and rural areas in Nepal can empower themselves by going beyond the traditional approach of the top-down teacher training model practised in the school education sector in Nepal which rarely focuses on the continuous professional development of teachers. Rana (2018) and Laudari and Maher (2019) indicated that the traditional approach to teacher professional development has not empowered teachers to teach and learn with ICT, although the government of Nepal has the vision to use ICT as teaching and learning tools.

Teachers in this study explored smartphone use as a means to develop their professionalism. They utilised it to learn about subject matter, ways to present ideas in the classroom, and to create content. This indicates that they tended to normalise the use of smartphones in their planning and delivery of lessons. However, the teachers did not use the technology regularly. Teachers, as in this

study, probably need to be aware of how smartphones can be used to enhance teaching practice (Davis, 1989). The user friendly design of smartphones allows teachers to use them for various professional activities with just a few hours of self practice. Smartphones are equipped with specific applications for specific activities such as internet browsing, audio-visual recording, and virtual discussion. Such applications make smartphones more convenient tools than traditional standalone digital tools. Teachers are attracted to smartphones because they perceive these device as useful for professional networking and problem solving as well as for monitoring their performance. Similarly, smartphones allow teachers to build a virtual community of practice by networking and solving profession-related problems through collaboration. This indicates that smartphones are gradually accepted as useful a technology for supporting teachers. The findings of this study align with the findings of the previous study by Adhikari et al. (2023) who found that teachers in urban areas accept educational technology if they are perceived as useful and are easy to use.

The study indicated the contribution of smartphones to teachers' professional development as they were utilising their smartphones to update themselves with modern digital technology and enhance their professionalism in rural and semi-urban contexts in Nepal. Teachers working in difficult situations in other developing countries in a similar context can utilize their smartphones in similar ways to enhance their professionalism. They can benefit from taking opportunities offered by powerful modern digital learning technology. These practices of teachers are similar to the practices of teachers working in difficult situations in other countries where formal teacher training programmes are not available for the teachers (Dahya et al., 2019; Motteram et al., 2020; Singh, 2017). Teacher-initiated virtual learning communities connect with each other using mobile messaging apps such as Facebook, Viber, and Whatsapp can connect despite the geographical barriers. Another implication of this study is that teachers' education agencies need to reconsider mobile technology's role and encourage teachers to utilize their smartphones if they do not have desktop-based technology.

Conclusion

Smartphones are readily available gadgets for daily activities. However, smartphones have recently emerged as a powerful tool for education worldwide. This case study aimed to explore secondary-level teachers' strategies for using these devices for their professional development. The study revealed that teachers use their smartphones to gain professional knowledge, skills, and opportunities regardless of location by using these devices. The study found that teachers used smartphones to develop content knowledge and pedagogical skills by accessing online digital resources. Similarly, they used these tools to record their teaching performances and to reflect and review to improve. The study also revealed that the teachers used their mobile devices for networking and collaborating with other teachers working in the same schools or other schools located across the country. Both constructs of the Technology Acceptance Model : PU and PEOU motivated the teachers to harness the potential of their smartphones for their professional development.

The findings of the study indicate that smartphones can be supportive tools for teachers' professional development. Moreover, the use of these devices could be transformative if existing teacher professional development programmes reconsider the roles of smartphones as a potential information and communication technology to deliver teacher professional development training. This study concludes that the role of smartphones in teachers' professional activities needs to

be acknowledged and the teachers' education agencies need to design mobile technology-based professional development activities in the post COVID-19 pandemic era.

This qualitative case study included only English, Science, and Social Studies teachers to limit the number of participants. Although I conducted interviews in face-to-face mode, I could not observe them for a week in their school because after the first round of my schools' visit, the schools were closed to prevent the spread of COVID-19. Therefore, I observed their activities in virtual spaces instead of collecting information about the use of smartphones for professional development activities. Longitudinal study on teachers' use of smartphones can provide insights into the changing practices of using smartphones among teachers.

This study indicated that not only individual teachers but also teachers' development agencies need to harness the potential of smartphones to empower them with the necessary knowledge, skills, and attitude needed for teachers where traditional approaches are inadequate to meet the changing needs of schools and learners.

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