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RESEARCH PAPER

Exploring TPACK Skills of Prospective Teachers and Challenges Faced in Digital Technology Integration in Pakistan

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PAPER INFO	ABSTRACT
	The current study was aimed to explore TPACK skills of prospective teachers and challenges faced in digital technology integration in Pakistan. The study was qualitative in nature and semi structured interview schedule was developed to collect data from prospective teachers. Purposive sampling technique was employed to collect data from 20 prospective teachers of 7 public sector universities. It was concluded that majority of the prospective teachers used general technological and pedagogical practices (GTPP), technological knowledge practices (TKP), Technological Pedagogical Knowledge practices (TPKP), Technological Content Knowledge practices (TCKP). Majority of prospective teachers reported multiple challenges in integration of digital technology in teacher education programs including lack of teacher training as one of the largest hurdle in digital technology integration, lack of digital technology resources or outdated digital technology resources, inadequate computer lab, lack of learning apps (courseware), financial constraints, lack of teachers' motivation to use digital technology, slow computers available at computer labs, and unavailability of technical support. It was recommended that digital technology infrastructure should be improved across all teacher education institution and it was further recommended that TPACK model of digital technology integration should serve digital technology integration in teacher education programs in Pakistan.

Introduction

In 21st century, advances in digital technology have enabled its rapid utilization for educational purposes throughout the world, which has affected almost every aspect of human life. In fact, developing countries like Pakistan could not achieve potential benefit of incorporating digital technology in higher education because of poor infrastructure; lack of teacher training, minimum funds, shortage of trained staff, less managerial support and policy implementation gap but still digital technology assists expand learning opportunities in formal and distance learning settings, access to educational resources through digitization of these resources, expedite and facilitate the education process for all stakeholders in provision of needed information and guidance.

Digital technology plays an increasingly pivotal role in lives of people, and it is visualized that digital technological literacy skills will become an operational demand for people's workplace, social, and even personal lives (Danner & Pessu, 2013; Vajargah, 2014). For these social, economic and personal reasons students will need digital technology skills if they are to contribute successfully in a knowledge-based society and to play an effective social, economic and political role in society. Higher education institutions around the world put their efforts to restructure classroom facilities for their higher education programs. Papanastasiou & Angeli (2008) argued that many countries take digital technology as a viable tool for innovation and innovation and that these countries have invested in the integration of digital technology in education at all levels.

Recent literature has highlighted the need for digital technology integration in teacher training programs through TPACK (Joo et al., 2018; Byker et al., 2018). However, the development of TPACK was important for prospective teachers and educators to use digital technology in subjects that do not focus solely on technological skills (Castéra et al., 2020). Whereas, providing only theoretical digital technology in educational institutions might not be sufficient for the desired integration. Therefore, digital technology resources and necessary training should be provided to prospective teachers for adequate use of digital technology in teaching. Similarly, negative attitudes and the limited knowledge of teachers about digital technology integration were the main barriers for the technology integration in education (Hew & Brush, 2007).

Mishra and Koehler (2006) suggest teachers to use digital technology in their instructions, they should synthesize their knowledge of technology, pedagogy and content to constitute their TPACK skills. This theoretical framework considers use of technology as an integral part of teacher knowledge. Therefore, Mishra and Koehler (2006) enhanced work of Shulman (1986) on pedagogical content knowledge to design a new theoretical framework based on more specialized, relevant, and applied knowledge that could help teachers to comprehend integration of teachers' knowledge of technology, pedagogy, and content to formulate four new components including technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK), technological content knowledge (TCK), and technological pedagogical content knowledge (TPACK) . They name this framework as TPACK or (TPCK) knowledge. TPACK framework suggests certain digital technological tools including hardware, software, courseware and other digital resources to present classroom instructions as well as to guide prospective teachers toward in depth understanding of the subject matter. TPACK framework was designed to describe prospective teachers for the skilled use of digital technology in teaching learning process. (Koehler et al., 2013).

In addition to investing heavily in pre-service training, attendees are not given real skills, expertise and the ability to integrate digital technology into their teaching effectively, professionally and efficiently (Evans and Hazelman, 2006) . However, the application of TPACK as a framework for the development of teacher integration of digital technology in classroom teaching changes the way educational technology is taught in teacher education programs (Tan et al., 2019). Meanwhile, Voogt and McKenney (2017) questioned the

adequacy of teacher education programs in preparing teachers to design courses for integration of digital technology. These courses therefore indicate the need to continue to develop structured learning models that can encourage teachers' design capabilities focused on TPACK supporting new levels of subject transformation. Therefore, present study was aimed to explore TPACK skills of prospective teachers in Pakistan.

Material and Methods

The study was aimed provide the participants' perspective with detailed description of reporting their TPACK skills and challenges faced in digital technology integration phenomenon. Hence, a qualitative research methodology was adopted to explore the TPACK skills of prospective teachers and their experiences related to challenges faced in digital technology integration in teacher education. According to the nature of the research study, phenomenology research design was used as it describes and interprets an experience by determining the meaning of the experience as perceived by the people who have participated in it. Moreover, phenomenology is a form of qualitative research that focuses on the study of an individual's lived experiences within the world. It further explores what people experienced and focuses on their experience of phenomena. Qualitative semi-structured interviews were conducted to collect data from participants as these can be used as much to consider experience, meanings and the 'reality' of participants' experiences as they can be used to explore how these experiences, 'realities' and meanings might be informed by discourses, assumptions or ideas which exist in wider society (Braun & Clarke, 2006). While, thematic analysis was adopted to deduce the sub themes. Thematic analysis is a hugely popular analytic method. Its popularity partly reflects its independence from any particular theoretical approach or epistemology persuasion (Braun & Clarke, 2006). For this reason, it will be useful to researchers who position their work within either realist or constructionist paradigms within the social sciences (Braun & Clarke, 2006).

Sampling

20 prospective teachers studying in final semester of graduate and undergraduate programs of teacher education who had studied courses related to content, pedagogy and technology were selected through purposive sampling technique from six public sector universities namely University of Sargodha, Sargodha, University of the Punjab, Lahore, GC University Faisalabad, Faisalabad, International Islamic University, Islamabad, National University of Modern Languages, Islamabad, and Islamia University of Bahawalpur, Bahawalpur and four campuses of University of Education including Township Campus, Lahore, Lower Mall Campus, Lahore, Faisalabad Campus, Faisalabad, Joharabad Campus, Joharabad. For this purpose 2 prospective teachers studying in their final semester of graduate and undergraduate programs of teacher education programs were selected from each selected public sector university and campus of University of Education.

Data Analysis

Responses of prospective teachers collected from 20 semi structured interviews were analyzed according to theme and its sub themes. For this purpose, model of Marshall and Rossman (2006) was followed by using coding and categorization of responses. Further, Verbatim quotation were also used as often the emphasis of the argument could not be depicted by picking words or phrases only. Verbatim quotation also improve quality of research (Corden & Sainsbury, 2006).

Development of Research Instrument

The researcher performed document analysis of scheme of studies of graduate (MA Education) and undergraduate programs (BS Education and B.Ed Hons.) of teacher education to determine courses related to technology, pedagogy and content and to find out key areas (factors and sub factors) related to TPACK constructs as well as to contextualize TPACK knowledge with available learning opportunities to prospective teachers. Then, the researcher studied the literature review for investigation of available instruments based on their strengths and weaknesses (i.e., Archambault and Barnett 2010; Pamuk et al. 2013). After examining these various available instruments on TPACK item by item, researcher discussed various items of these instruments to decide, based on the principles summarized by Pamuk et al. 2013, whether or not these be included in final instrument after introducing necessary modifications. Finally, a semi structured interview schedule was developed based on TPACK model to collect data from prospective teachers for investigation of TPACK skills possessed by prospective teachers and their development at classroom level in Teacher Education Programs in Pakistan.

Results and Discussion

Qualitative Analysis of Interviews of Prospective Teachers

Semi structured interview protocol was designed to received feedback of prospective teachers about their general technological and pedagogical practices (GTPP), technological knowledge practices (TKP), Technological Pedagogical Knowledge practices (TPKP), Technological Content Knowledge practices (TCKP) and finally, challenges faced by prospective teachers in digital technology integration. 20 interviews were conducted from prospective teachers. Responses of prospective teachers were analyzed according to theme and its sub themes in the following tables Nos. 1 to 5

Table 1
General pedagogical and technological practices of prospective teachers

Themes	Sub Themes	Frequency (*f*)	Percent %
Teaching Courses	Technology Courses	13	65.00
	Pedagogy courses	18	90.00
	Content Courses	12	60.00
Preferred Teaching Strategies	Discussion	18	90.00
	Lecture	15	75.00

	Demonstration	13	65.00
	Questioning	12	60.00
	Small Group Discussion	9	45.00
Daily Digital Technology usage	Not Available	2	10.00
	1-2 hours	10	50.00
	3-4 hours	6	30.00
	5 and more hours	2	10.00
Time spend on computer for study	Not Available	2	10.00
	1-2 hours	12	60.00
	3-4 hours	4	30.00
	5 and more hours	2	10.00

Table No. 1 indicates that majority of prospective teachers showed their preference for teaching technology courses including computer Application in Education and ICT in Education or Educational Technology, Most of the prospective teachers preferred for teaching pedagogy courses including teaching of Science, Teaching of English, Teaching of Math, Teaching of Urdu and Teaching of Social Studies, many of the prospective teachers had preference for teaching content courses including General Science, Math, Social Science and History of graduate and undergraduate programs of teacher education. Majority of prospective teachers had preference to use discussion method, apply lecture strategy, use demonstration strategy, and many of them liked to use questioning strategy, while some of them had preference to employ small group discussion in their teaching. Majority of prospective teachers had 1-2 hours daily digital technology usage, some of them had 3-4 hours daily digital technology usage and a few prospective teachers had 5 or more hours of daily digital technology usage while a few of prospective teachers also reflected no usage of digital technology on daily. One of prospective teachers (pt8) who did not use digital technology on daily basis argued, *"I don't have my personal computer or Android phone so I cannot use digital technological resources on daily basis and we write most of the assignment in hand written format and therefore, I take help from my classmates or visit library to complete my assignment task."* The second respondent (pt12) who did not use digital technology on daily basis replied, *"I receive help from my classmates or visit computer lab whenever I need to use computer or internet to do classwork but not only daily basis and it takes me more time on computer because I am not comfortable with it."*

Table 2
Technological Knowledge Practices (TKP) of Prospective Teachers

Themes	Sub Themes	Frequency (*f*)	Percent %
Computer software (apps) used by	MS Word	18	90.00
	MS PowerPoint	18	90.00
	MS Excel	18	90.00

Prospective Teachers (PTs)	Web Browsers	18	90.00
	Microsoft Windows	14	70.00
	Adobe Reader	14	70.00
	Gmail	10	50.00
	SPSS	6	30.00
	Dropbox/SkyDrive/Gdrive	3	15.00
Digital technology support provided by Teacher Educators (TEs)	Mostly	2	10.00
	Sometimes	6	30.00
	Rarely	9	45.00
	Not at all	3	15.00
Students' facilitation in usage of Digital technology by TEs	Share E-notes	14	70.00
	Allow them to connect their USBs with laptop	9	35.00
	Allow them to use their personal laptop	8	40.00
	Share applications	7	35.00
	Share E books	6	30.00
	Share Mobile Wi-Fi	2	15.00
	Share E Articles	2	30.00
	Dropbox/SkyDrive/Gdrive	2	10.00
Technological resources available at department	Internet	16	80.00
	Computer lab	14	70.00
	Multimedia Projectors	12	60.00

Table No. 2 reflects that majority of the prospective teachers were using MS Word and MS PowerPoint applications, MS Excel, and Web Browsers, MS Windows (System Software) and Adobe Reader, Gmail whereas some of the respondents were using SPSS and just a few of the prospective teachers were using online storage websites.

Majority of the prospective teachers received digital technology support from their respective teachers rarely, some of them agreed to sometimes, just a few of them proclaimed most of the time for receiving technological support from their respective teachers, and even a few of those responded receiving no digital technology support from their respective teachers. One of the respondent (pt3) expressed, *"We mostly get technological support from our computer lab manager instead of our teachers related to technological issues like installing Windows, MS Office, and SPSS etc."* One of the respondents (pt4) reflected, *"We do not receive help from teachers regarding technological issues but we help each other and do not consult with teachers. All the teachers are not proficient in*

technology." One more prospective teacher (pt16) reported, "*Teachers guide the students how to use technology to access contents related to classwork or assignments during class.*"

To facilitate prospective teachers in use of digital technology, majority of prospective teaches reflected that their respective class teachers provided them E-notes, some of the teachers allow them to connect their USBs with their computer systems/laptops for sharing e-books and e-notes and allowed prospective teachers to use their personal laptops during classes, share their application software, a few of them reported their teachers provided them e-books, the least majority shared their mobile Wi-Fi when needed in classroom, provided them e-articles and shared their online storage data with them.

Responding to technological resources available at department, Majority of prospective teachers reported their institutions had internet facility, computer labs, and some of those respondents reported their institutions had provided them multimedia projectors/LEDs in their classes for effective delivery of instructions. One of the prospective teachers expressed (pt8), "*Actually, digital technologies are not available in our department but teachers guide us that how can we use digital technology for study during classes.*"

Table No. 3
Technological Pedagogical Knowledge Practices (TPKP) used by Teacher Educators at classrooms

Themes	Sub Themes	Frequency (*f*)	Percent %
Giving feedback on assignment work	Rarely	4	20.00
	Face to face only	16	80.00
Teaching through multimedia projectors/LED	Mostly	9	70.00
	Sometimes	3	15.00
	Rarely	5	25.00
	Never	3	15.00
Recorded video lectures by TEs	Rarely	2	10.00
	Never	18	90.00
share video lectures of experts	Rarely	6	30.00
	Never	14	70.00
Recommend online quiz for assessing learning	Rarely	3	15.00
	Never	17	85.00
Mobile Learning Activities	Mostly	2	10.00
	Sometimes	4	20.00
	Often	6	30.00
	Rarely	8	40.00
Share courseware (learning apps)	Rarely	3	15.00
	Never	17	85.00

E-learning activities at classroom	Present contents through multimedia	14	85.00
	Asks prospective teachers to present through multimedia	12	65.00
	Searching of content using different websites	9	60.00
	No such activities	2	10.00
Students' collaboration through digital technology	WhatsApp Group	16	80.00
	Email	11	55.00
	Cell phones	8	40.00

Table No. 3 presents that majority of the prospective teachers reported that most of the teacher educators did not give feedback about their assignments to prospective teachers submitted through Email and they used to discuss face to face at classrooms. Only a few prospective teacher respondents reported that their teachers gave them feedback on their assignment submitted through Email.

Some of prospective teachers reflected that teacher educators used multimedia projectors/LEDs mostly during classroom teaching, a few of them reported use of multimedia projectors/LEDs sometimes and similarly, some of them reported rare use of multimedia during teaching at classroom while a few of the respondents reported no use of multimedia at classrooms. Responding to the question related to sharing recorded video lectures by teacher educators, majority of prospective teachers expressed that teacher educators did not share their recorded video lectures while a few of the respondents reported sharing of recorded video lectures by their teachers during their classes.

Related to the theme of sharing video lectures of experts by teacher educators, majority of prospective teachers reported that their teachers did not share video lectures of experts while a few of the respondents reflected that their teachers shared such lectures rarely.

Answering question related to recommending online quiz (E-quiz) for assessing learning of prospective teachers, Majority of prospective teachers reflected that their teachers did not recommend/ create any online quiz for them while a few respondents reported that their teachers offered them online quiz to assess their learning.

Next question was related to use of Mobile Learning (ML) of prospective teachers at classrooms. Some of prospective teachers reflected that their teachers rarely used Mobile Learning for prospective teachers, a few of them agreed to often and sometimes use of

Mobile Learning at classroom whereas a few of them also proclaimed maximum use of mobile leaning at classroom by teacher educators. One of the prospective teachers (pt4) reflected, "*We use mobile for content searching related to assignments and sharing contents (notes, assignments etc.) with other fellows.*"

Prospective teachers were inquired about sharing/recommending of courseware by the teacher educators. Majority of the respondents reflected that their teachers had never shared/recommended courseware with them while a few of them reported sharing of courseware by their respective teachers.

Responding to the question related to collaboration of prospective teachers through digital technology, majority of prospective teachers asserted that they had used WhatsApp for collaboration, some of them proclaimed through Email (sending and receiving notes as well as assignment/project work) and mobile phone (though calling and SMS).

Table 4
Technological Content Knowledge Practices (TCKP) of Prospective Teachers

Themes	Sub Themes	Frequency (*f*)	Percent %
Accessing/searching content from internet	Mostly	8	90.00
	Sometimes	10	50.00
	Rarely	2	10.00
Developing E Notes for studies	Mostly	4	20.00
	Sometimes	4	20.00
	Rarely	9	30.00
	Never	3	15.00
Accessing websites related to study material (like Slideshare.com, Scribd.com etc.)	Mostly	6	30.00
	Sometimes	4	20.00
	Often	2	10.00
	Rarely	6	30.00
	Never	4	20.00
Sharing e notes, books, articles or online platforms with fellows	Sometimes	1	5.00
	Rarely	1	5.00
	Never	18	90.00

Table No. 4 reflects that prospective teachers were inquired about accessing/searching content from internet. Majority of the prospective teachers reported to access/search content from internet as sometimes. Some of them respondents expressed always to access contents from internet while a few of the respondents reported accessing/searching of content from internet rarely. One of the respondents (pt4)

expressed, "I access/search contents for learning from internet for notes and assignment work."

Responding to the question related to developing E-Notes for their studies, majority of the respondents answered that they used to develop e-notes for their studies rarely, 4 (20%) respondents reported as always and sometimes while 3 (15%) reported that they did not develop their e-notes for their studies. One of the respondents (s11) answered, "It depends on teachers as some teachers require to develop e-notes and most of the teachers do not require." One more respondent (st18) replied, "I don't have computer/laptop so I do not need e-notes to be prepared."

Prospective teachers were inquired about accessing websites related to study material (like Slideshare.com, Scribd.com etc.). Some of prospective teachers reported that they were accessing websites related to their studies, a few of them expressed accessing websites rarely or sometimes, whereas a few of them also reflected accessing such websites as never. One of the respondent (p13) replied, *"I do not use computer or internet at university or on my mobile for accessing any kind of websites. Instead, I get help from my fellows to just copy and paste my assignments. I submit all my assignments in writing form and teaches also provide us all notes in printed form."*

Responding to the question related to sharing/publishing e- notes, e-books, e-articles on internet or online platforms with fellows, majority of prospective teachers reflected that they did not share/publish their e-material/content with their fellows on internet or online platforms like yahoo groups or google groups. One of the prospective teachers asserted, *"We do not have such of kind of training to share any study material through online sharing/publication. We do not have any computer lab at our department to work on such projects. We use mobile for sharing through WhatsApp and Email."*

Table 5
Challenges faced by Prospective Teachers in use of digital technology at Teacher Education Institutions

Themes	Sub Themes	Frequency (*f*)	Percent %
Satisfaction of TE with available digital technological resources	Very much	2	10.00
	To some extent	7	35.00
	Little a bit	5	25.00
	Not at all	6	30.00
Level of Digital Technology Integration in TEPs	To some extent	3	15.00
	Low level	17	85.00
Key challenges in DTI	lack of teaching training	16	80.00
	lack of DT resources	15	75.00

lack of technical support	14	70.00
Inadequate computer lab	12	60.00
lack of learning apps	10	50.00
financial constraints	10	50.00
Lack of motivation of teachers	4	20.00
slow computers	3	15.00
require technical staff	2	10.00

Table No.5 reflects that prospective teachers were asked about their level of satisfaction about available digital technology resources at teacher education institutions and challenges they faced in digital technology integration. Responding to question related to their satisfaction level about available digital technology resources, majority of prospective teachers were satisfied up to some extent, some of the respondents were hardly (little a bit) satisfied while some of the prospective teachers were fully satisfied whereas a few of the respondents were not satisfied with available digital technology resources at teacher education institutions.

Answering to the question related to level of digital technology integration (DT) in Teacher Education Programs, majority of the prospective teachers felt that DT integration level was very low while a few of the respondents reported digital technology integration was done up to some extent. One of the respondent (pt10) reflected, *"Teachers use digital technology in a few courses but not in all courses."* It means all teacher educators were not using digital technology in their instructions.

Discussing about key challenges faced by prospective teachers in digital technology integration, majority of the prospective teachers felt lack of teacher training as one of the key hurdle in digital technology integration, many of those respondents conceived lack of digital technology resources or outdated digital technology resources and inadequate computer lab, lack of learning apps, financial constraints as the major challenges, while a few of the respondents considered lack of teachers' motivation to use digital technology, slow computers, and unavailability of technical support were the big hurdles. One the prospective teachers (pt9) responded, "We have no performed a single computer practical at our department as no computer lab is present at department and we do not have access to internet also. Even, no multimedia is available for teachers and students in classrooms."

Conclusion

The findings and conclusions of the study reveal TPACK knowledge of prospective teachers, level of digital technology integration in curriculum of teacher education graduate and undergraduate programs, infrastructure of digital technology to support implication of

digital technology as well as challenges faced by prospective teachers in digital technology integration at teacher education institution in Pakistan.

It was concluded that majority of the prospective teachers preferred digital technology usage as they were using MS Word and MS PowerPoint applications, MS Excel, and Web Browsers, were using MS Windows (System Software), Adobe Reader, and Gmail and had acquired high level of knowledge in constructs of TPACK model and they were using digital technological resources from 1-2 hours on daily basis. In fact, this finding is important, as previous research work suggested that prospective teachers' TPACK beliefs predict their technology integration in the classroom (Abbitt, 2011; Maor, 2017). Sweeney and Drummond (2013) concluded that pre-service teacher education should not only focus on how to use digital technology but also how digital technology intersects with pedagogical and content knowledge and a knowledge framework is needed that adjoins factors of technology, pedagogy, and content in complexly is called Technological Pedagogical Content Knowledge (TPCK) (Koehler & Mishra, 2009). Mare, Jormanainen, & Tedre (2019) also found that prospective teachers possessed satisfactory levels of strengths in these areas of technological knowledge and skills. Findings of these researches on the development of TPACK in prospective teachers (Ratheeswari 2018; Ganayem & Zidan, 2018; Palagolla & Wickramarachchi, 2019) support the results of the present study.

Results of semi structured interview also revealed that most of the prospective teachers could not express practical use of digital technology in classroom in instructions and learning activities as majority of the prospective teachers reported that most of the teacher educators did not give feedback to prospective teachers through email on their assignments and they used to discuss their feedback face to face at classrooms only. Majority of prospective teachers reflected that their teachers did not recommend/ create any online quiz for them. However, research has shown that prospective teachers did not feel sufficiently prepared to use digital technology in their classrooms (Sang, Valcke, van Braak, & Tondeur, 2010). It was concluded that majority of prospective teachers expressed that teacher educators did not share their recorded video lectures and did not share video lectures of other experts and further they did not share or recommend any courseware (learning applications). Therefore, prospective teachers could not get potential benefits of digital technology integration in instructions and likewise, prospective teachers of current teacher education, who are at times known as "digital natives," had some knowledge of digital technology but were often inefficient in integrating them within their curriculum. (Ottenbreit-Leftwich, et al, 2010; Funkhouser & Mouza, 2013). It might be possible because of presence of poor/limited infrastructure of digital technology at their institutions or lack of on hand training for use digital technology and less intervention with practical implication of digital technology in teaching learning process. Therefore, prospective teachers still need to be guided, trained and given facilities through lectures to improve their teaching abilities (Dwiningsih, Poedjiastoeti & Muchlis, 2019). It was also concluded that majority prospective teachers were not satisfied with the level of digital integration in instructions as well as available digital technological infrastructure at their institutions whereas, successful use of digital technology in the classroom required thoughtful

integration of digital technology and pedagogical processes during lesson preparation. (Janssen, Knoef, & Lazonder, 2019)

It was concluded that majority of prospective teachers reported multiple challenges in integration of digital technology in teacher education programs including lack of teacher training as one of the largest hurdle in digital technology integration, lack of digital technology resources or outdated digital technology resources, inadequate computer lab, lack of learning apps (courseware), financial constraints, lack of teachers' motivation to use digital technology, slow computers available at computer labs, and unavailability of technical support. Likewise, Voogt & McKenney (2017) found that teacher educators faced difficulty in integrating digital technology in their instructional processes. They were also working in same environment in which they were facing similar issues and might be over burdened with other official engagements to collect time to think and implement new innovative ideas in their teaching (Regan, et. al, 2019). Findings of previous research showed that prospective teachers still faced difficulties in integrating their content with digital technology as the resource.

The present study concluded that digital technology was integrated to some extent in teacher education programs as reported by Mare, Jormanainen, & Tedre (2019), the results from analysis of prospective teachers' experiences and digital technology related support received from their institutions and teacher-educators indicate low level of readiness in integrating digital technology into teaching and learning. Most of the teacher education institutions lacked in provision of basic digital technological facilities to prospective teachers in Pakistan including access to e library, personal web resources, LMS, CMS, institutional websites, blogs, online discussion forums, learning applications (courseware), e-assessment activities, interactive whiteboards, multimedia projectors, printers, scanners, high speed internet, and video recorded lectures. Findings of the study were with findings of previous researches held in Pakistan (Amjad, 2006; Nisar, Munir, & Shad, 2012; Shaikh & Khoja, 2013; Munir & Khan, 2015; Saeed, Ahmed, & Malik, 2017; Saleem & Zahra, 2017; Ali, Riaz, & Wattoo, 2018).

On the basis of findings and conclusions, it is recommended that infrastructure and resources of digital technology should be improved at teacher education institutions. It is further recommend that digital technology should be integrated in curriculum of teacher education programs by application of TPACK digital technology integration model.

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