



**RESEARCH PAPER**

**A Qualitative Study on Challenges and Opportunities for Technology Integration in Pedagogy**

**<sup>1</sup>Dr. Firdous Bugti, <sup>2</sup>Dr. Pir Suhail Ahmed Sarhandi, <sup>3</sup>Sana Mairaj Bugti**

1. Assistant Professor, Department of Teacher Education, Shah Abdul Latif University, Khairpur, Sindh, Pakistan
2. Registrar, Aror University of Art, Architecture, Design & Heritage, Sukkur, Sindh, Pakistan
3. Lecturer, Department of Teacher Education, The Sheikh Ayaz University, Shikarpur, Sindh, Pakistan

**Corresponding Author** ssarhandi@yahoo.com

**ABSTRACT**

The study examined the effectiveness of technology training for enhancing skills of university teachers and to identify the challenges and opportunities for technology integration in pedagogy. It has never been an easy task for teachers to use technology effectively in pedagogy without receiving technology based professional development opportunities, besides there are several other challenges that hinder teachers to integrate technology in pedagogy. This qualitative study collected data by conducting semi structured interviews from fourteen teaching assistants. The data was analyzed thematically. The study recommends that universities develop policies to provide comprehensive technology training to enhance teachers' skills and ensure the necessary resources are available to promote effective technology integration in teaching and learning. Overall, the findings indicate that while technology training can boost teachers' capabilities, universities must address significant infrastructural and institutional challenges to enable successful technology integration in pedagogy.

**Keywords:** Challenges and Opportunities, Pedagogy, Professional Development, Technology

**Introduction**

As we reach the fourth industrial revolution, our society is entirely occupied by technology such as artificial intelligence and robotics (Musarat et al., 2023). The effect of that technology boom is being felt equally in the field of education as with many other fields (Asad et al., 2023; Aslan & Shiong, 2023; Amir et al., 2022). Additionally, it is elaborated by (Mohamad et al., 2020) that 21<sup>st</sup> century is the era of Generation Z learners using information and communication technology for their learning. According to the studies (Gewerc et al., 2018; Scherer et al., 2016) use of technology accelerate students' engagement, motivation, and helpful for attaining learning objectives. The future of the education will soon be reshaped by a number of cutting-edge technologies. Tahir & Farooq, (2023) declared that to keep up with the rest of the world, Pakistan also needs to improve its educational system. Studies conducted by Rahiman et al., (2023) and Martins et al., (2019) declared that use of technology in classroom teaching is important for teachers to be advanced in knowledge and to meet students' expectations. It is therefore crucial for educational institutions to train the teachers and provide the required resources to support technology integration in pedagogy as revealed in the studies (Muir-Herzig & Mulder, 2018; Teo, 2015) that professional development opportunities help teachers to enhance skills and build their confidence for using technology. According to (Ahmad et al., 2023; Umar et al., 2023; Snezhko et al., 2022) most of the teachers even though recognized the need to integrate technology in teaching, very few of them tried to use it. Muir-Herzig & Mulder, (2018) and Ertmer et al., (2012) mentioned the range of factors including lack of training, classroom

management issues, and skepticism about its impact on student learning hesitate teachers to fully embrace technology.

Technology integration in pedagogy could never be an easy task for teachers of developing countries like Pakistan due to insufficient opportunities of technology trainings and lack of resources. This study is therefore significant in the context of Shah Abdul Latif University, Khairpur indicating the teachers of remote areas of Sindh, Pakistan where teachers have rarely got technology training opportunities that lacks them to integrate technology in pedagogy besides it also draws attention on challenges and opportunities to integrate technology in pedagogy.

## **Literature Review**

Technology being an essential part of the time influence significantly all spheres of life (Gnambs, T. 2021). It transformed education system and instructional practices into more interactive and productive pedagogical strategies (Lin et al., 2017). According to (Consolie et al., 2023) pedagogical strategies refers to learning by doing, active learning, collective learning, game-based learning and problem-solving learning has been shifted from merely traditional method to continuously evolving multimodal learning approaches. Besides, technology also offers variety of tools that equally useful for classroom environment as well as online teaching and it assist to promote interactive pedagogy (Jogezai et al., 2021). According to Daniela et al., (2018) use of technology in higher education has been a matter of concern for several decades. Whereas talking about the context of higher education (Manacap et al., 2021; Salam et al., 2019) acknowledged that technology integration has played role as a catalyst to transform teaching strategies and enhance teachers' effectiveness. However, the technology integration in education is still challenging and it needs collective effort and administrative support within the institutes for technology integration in teaching (Castro-Guzman, 2021). Furthermore, Fannakhosrow et al., (2022) stated that it is imperative that we integrate ICT into our pedagogical practices in classroom teaching for improving fairness and quality in teaching and learning so for that teachers' professional development and well-furnished educational environment be realized. Professional development programs for teachers also emphasized by (Guillen-Gamez & Mayorga-Fernandez, 2020) for effective integration of technology into their lessons and pedagogical practices.

National educational policies of Pakistan have also special concerns for technology integration in pedagogical practices and recognized its worth to align with international standards of education (Pakistan Ministry of Education, 2018). Pakistan is striving to provide technology training opportunities to teachers so that worldwide standards of teaching with technology could be met (Yeh, Lin, HSU, Wu, and Hwang, 2015), yet majority of teacher are deprived of adequate technology trainings. Apart from technology training there were several other challenges i.e. availability and accessibility of internet, infrastructure, funds, load shedding of electricity, shortage of time, insufficient incentives and inadequate administrators' support also hinders teachers to integrate technology in pedagogical practices mentioned by Suleman, Aslam, Javed, and Hussain, (2011). Different studies (Akram et al., 2021) declared lack of infrastructure and lack of electricity and internet, (Asad et. al., 2021) identified lack of technological knowledge and expertise and (Abbasi et al., 2021) highlighted the lack of teacher training, (Shrestha et al., 2022) found poor network, lack of technological skills and support from administration, efficacy and confidence of teachers as well as poor infrastructure as challenges that critically affects technology integration in pedagogy.

Teaching Assistants of Shah Abdul Latif University, Khairpur equally suffered with more or less same kind of situation. Current study was therefore crucial and significant to better understand the effectiveness of technology trainings for enhancing skills of university

teachers and to identify the challenges and opportunities faced by university teachers to integrate technology in pedagogy in the settings of Shah Abdul Latif University, Khairpur.

### **Material and Methods**

Research methods refer to set of investigation; process of sampling, selecting sample, data collecting tools and methods and techniques for data analyses and interpretation employed for any specific study. Following procedures and tools were used to determine the effectiveness of technology training for enhancing skills of university teachers and identify the challenges and opportunities for technology integration in pedagogy.

This is a qualitative study that employed convenient sampling. Bryman, (2012) indicated that convenience sampling is one in which the participants are easily available to the researcher by means of their accessibility. Data was collected through semi structured interviews conducted at different timings due to availability and accessibility of fourteen selected teaching assistants (Nine females and five males) who voluntarily agreed to share their experiences regarding effectiveness of technology training after receiving technology training organized under the umbrella of Office of Research and Innovation Commercialization (ORIC) SALU, Khairpur over a period of four weeks (last couple of weeks in April and first couple weeks in May-2021) and identified challenges and opportunities while integrating technology in real classroom teaching.

The data was analyzed by using semantic thematic analysis technique. All interviews were audio taped and transcribed. After transcription initial and final coding was done and finally different themes were generated. The researcher used member check strategy and transcribed data was sent back to the participants and they were requested to review the findings based on their responses for further validation of results and accuracy.

### **Results and Discussion**

The findings of the study are represented under following themes generated on the bases of participants' responses that determine the effectiveness of technology training for enhancing skills of university teachers and identify the challenges and opportunities for technology integration in pedagogy.

#### **Theme 1. Working Environment**

The working environment refers to the settings, physical conditions and social features where individuals perform the job. Theme-1 comprised of two sub themes on the bases of responses:

##### **Sub-theme 1.1 Support from Administration and Colleagues**

Majority of the respondents declared that they got support in many ways, for example, *"... my chairperson support and encourages me to use technology in teaching"* R9. *"... my colleagues also help and support me... I believe that we are unable to do any task perfectly without the help of our seniors"* R14. *"... as for as administration is concerned, they provide us the resources through which we can visually interact with students and make them understand the main aspects related to our subject"* R4. *"... our environment is supportive... my seniors...my colleagues...my chairperson supports me a lot"* R10. *"... they (seniors) motivate me to integrate the technology and also share their personal gadgets when I required"* R13.

##### **Sub-theme 1.2 Availability of Resources:**

Several respondents mentioned various technological tools that are helpful in teaching and make them confident. As mentioned, that *"...our department is equipped with latest technology...availability of projector and multimedia"* R2. Likewise, R9 also reported that *"...we also have the facility of multimedia and projector"*. R1 added that *"...the main and basic support I believe is the availability of internet and furnished labs...without which no teacher can implement the technology...so internet connection 24/7 works in our department"*.

## **Theme 2. Technology related Training**

Different responses were collected regarding 'Theme 2. technology related training' and the findings are represented under two sub-themes.

### **Sub-theme 2.1. Learnt Technological Skills**

In technology training sessions according to respondents they learnt many technological skills and knew about different useful technological applications and its integration in pedagogy. As R11 mentioned that *"...I learnt Google classroom...MS Teams...Kahoot and Nearpod"*. Same viewpoint was shared by R1 *"...I learnt the use of Nearpod...Kahoot...MS Teams...after attending this training I feel myself confident enough to use all these learnt Apps in my pedagogy"*. Apart from technological skills respondents also learnt how to use these skills in lesson planning, assessment and communication. One of the respondents said that *"I learnt ... how to easily manage the class... how to support the students ... how to deal effectively with students... how to communicate... and it also help me to solve my problems that happens in the class premises"* R11. A respondents shared the experience after availing opportunity of technology training that *"I learnt to design the lesson plan and I also learnt...designing different activities...time management...assigning and assessing assignment online"* R5 whereas R10 said that *"...I learnt different ways of sharing the knowledge"*. Another participant added that *"... I also learnt how to fill this generation gap between students and teachers... because students are now well equipped and well aware about the use of technology than we teachers... and I also learnt to adopt versatility in teaching style and activities to keep students motivated and fulfill their needs as per the need of 21st century"* R7.

### **Sub-theme 2.2 Suggestions to Organize Technology Training**

Technology related training was highly recommended and suggested by all the respondents. It was indicated *"...with the core of my heart I would suggest to arrange such sort of technological and informative training and workshops in the university for all the teachers either they are teaching assistants...lecturers...professors...even for the chairpersons and deans of the departments...in addition to this I would suggest to arrange such sort of workshops for all level of teachers...teaching in schools...in colleges...or in universities"* R1. Similarly, a respondents shared *"I would like to suggest that such type of trainings is not only useful for the teaching assistants but also for our senior ones...and also for the researchers"* R8. R12 recommended technology related training by stating *"Technology integration workshop was very much useful and such workshop should be arranged in future...whatever the new technologies are coming we must be aware about them"*. In reference to National Professional Standards for Teachers in Pakistan one of the respondents highlighted the demand of technology-based training and said *"...yes...of course I would suggest conducting such type of workshops... this is like a chain...if our seniors are not well aware and do not transfer the information to the juniors...how will the juniors be encouraged? So, I think our seniors need it the most...such type of trainings must be organized from top to root level so every teacher will be on one page and know about the importance of technology...and there is also one standard from 10 NPSTP that the teachers must be aware about the use of technology"* R7.

## **Theme 3. Technology Integration in Pedagogy**

Different respondents portrayed that they integrate technology in pedagogy by using different application learnt in technology training. As different aspects of Kahoot was used by R1 “...as for as Kahoot App is concerned ...I shared the link with my students and when they opened it, there was a picture...they saw the picture then the questions started popping on the screen...they have to attempt the questions within given time...and in this I felt that the students enjoyed it a lot...it was like they were playing a game with the interest to win it...it was like learn with fun for them”. R3 said that “...firstly I thought that we can only conduct the quiz here but in Kahoot we have the option for fill in the blanks...like one word answer...true/false”. R6 stated about Kahoot App “...it was like a game...I planned a quiz and ask students to join and play...they all were comparing their scores as they were counting their points”. And “Kahoot app inspire me a lot...the score system was very effective...it was like a game to the students and also make them take interest in learning...the main thing I loved about this app was that student who was the low scorer try to earn more points in the next quiz and the one who score high tries to be on the top...this enhance the learning among students” R13.

Power point presentation was also used by the respondents, as one of the respondents said that “...I just make the group of students... and I just show them the ppt... and ask one of the students to come and explain the ppt and rest were ask to discuss it... as per my competence... I tried my best to integrate technology in my lecture...” R2.

Nearpod was applied for effective teaching as mentioned, “I was very impressed by the environment provided in Nearpod... because it facilitates with lesson planning along with content and different activities... mean all in one platform” R4. And “... somehow I implemented ... as every student own a phone... so I designed an activity on Nearpod in my lesson planning... and assigned the task to search for the book... Shah jo Risalo and search Sur Yaman Kalyan then select a poetry from it and share its meaning and explain why you selected that particular poetry...” R7. One of the respondents depicted that “It would be helpful for me like in making lesson plans on Nearpod... through interactive lesson plans I can upload whatever material related to it... like pdf files... or any video” R12.

R 11talked google classroom “Google classroom... where I can enrol my students... assign them any assignment...and when students are going to submit their assignment sheet or some sort of mid term test... so there is an automatic green card for them... and if I am going to assign score...it is also visible to the students.”

#### **Theme 4. Challenges in Technology Integration**

Besides availing above mentioned opportunities respondents also faced challenges for technology integration in pedagogy. Very first challenge was resistance to adopt the change as portrayed “we are unable to be advanced... flaw lies in ourselves... they (seniors) are not ready to adopt the new things... we find lots of criticism in our society when we are going to adopt new things... or new technology” R2.

One of the respondents from Sindhi department mentioned the availability of sindhi content on internet and said “... we lack the content also... like we do not get enough content on our Sindhi language... we don't have slides... we don't have videos related to our content” R7. Apart from above challenges some of the department also have lack of resources as a respondents mentioned “... in our department we don't have infrastructure for integration of technology... that is why we don't get enough support... and internet facility is also not available... neither we have multimedia nor projector...” R7. Another response was collected “... due to fewer resources we felt some difficulty to teach as per our planning...” R14. Likewise, “... due to unavailability of the resources we couldn't implement such type of things which we learnt here (in technology training)” R8.

Poor access of internet was also highlighted, “... so mostly we face the internet issue... some have network issues... signal problem” R11. It was also mentioned by R8 that “... so here

*is difficulty in internet due to signal problem...". A respondent revealed that "I am teaching from home, so I face the problem of internet because I am living in an area where signals are so poor" R9. According to one of the respondent poor internet connection impacts teacher's motivation, "... sometimes Wi-Fi connection is slow and that buffer scene irritates me as well as my students" R10. Another declared that "...sometimes... there is issue of Wi-Fi connection... and due to that the planning may goes wrong" R12.*

## **Conclusion**

The aim of the current qualitative study was to determine the effectiveness of technology training for enhancing skills of university teachers and identify the challenges and opportunities for technology integration in pedagogy. Overall, four themes were generated from analyses of verbal responses collected through semi-structured interviews. This study revealed that technology training was effective to enhance skills of teachers and highly recommended by all teaching assistants for teachers of all levels (refer to sub-theme 2.2 R 1,7, 8, 12) because training sessions enhanced teachers' skills and they learnt use different technological tools/applications helpful for technology integration in pedagogy (refer to sub-theme 2.1 R 1, 5,7,10, 11). The result was aligned with the findings of studies (Hafeez et. al.,2023; Zaman et. al., 2023; Tanjung, 2022; Guillen-Gamez & Mayorga-Fernandez, 2020; Al-Awidi and Aldhafeeri, 2017; Sarhandi et. al., 2016) indicated the need of technology training of teachers for enhancing teachers' technological skills and to fulfil the gap to integrate technology effectively in teaching. Moreover, technology training was suggested to be organized frequently in future for all (refer to sub-theme 2.2, R1,8,12). Study conducted by (Abbasi et al., 2021; Irum, Munshi, and Awan, 2018) highlighted the lack of teacher training also aligned with the findings of current study that teacher educators must provide facilities for effective technology use specifically frequent trainings that help to enhance teachers' technology skills and its integration in pedagogy. Similarly, Beriswill et. al., (2016); and Bo, (2010) indicated that frequent professional development opportunities transform traditional teaching methods with technology-based methodologies of teachers.

In response to mention opportunities and challenges, all TAs gave mixed replies that in some departments of SALU, Khairpur TAs were encouraged and availed opportunities to integrate technology i.e. good working environment, support from administrators (refer to sub-theme 1.1, R4,9,10,14), provision of resources, various technological tools; projector, multimedia, availability of internet and furnished labs (refer to theme 1.2, R 1, 2, 9). The findings of the study were supported by study (Al-Kafyulilo, Fisser, and Voogt, 2015) indicated the support from heads and colleagues within the institution using different incentives, rewards, motivation and accessibility of hardware encourage teachers for technology integration.

On other hand in some department TAs faced challenges. Study declared the reluctant attitude specifically by senior teachers to adopt the change and criticism on use of technology (refer to theme 4. R 2). Similar to the findings, the study conducted by Hardisky, (2018) revealed that teachers particularly veteran teachers displayed a reluctance to change teaching methods and felt the use of technology as a burden and obstacle, in contrast novice teachers were more open to explore emerging methods for integrating technology in pedagogy. Secondly the lack of resources; multimedia, projector, network issue, signal problem, slow Wi-Fi connection, lack of availability and accessibility of internet, lack of appropriate infrastructure, lack of administrators' support and electricity issues (refer to theme 4. R 7,8, 9, 10, 12, 14) and concluded that these challenges adversely affected technology integration in pedagogy. Besides lack of content related with local language Sindhi on internet was barrier for local language teachers to get benefit from internet content-based resources and was distinct challenge revealed in current study (refer theme 4. R 7). The studies (Ertmer et. al., 2012; Suleman et. al., 2011) found same challenges as software and hardware issues, financial and training issues, electricity load shedding, lack of availability and accessibility of technology, shortage of time, insufficient incentives and

inadequate administrators' support; (Akram et al., 2021) declared lack of infrastructure and lack of electricity and internet; and (Shrestha et al., 2022) found poor network, lack of technological skills and support from administration were the challenges that hinders use of technology in teaching and learning.

Concisely the study concluded that frequent technology training is crucial factor for enhancing skills of university teachers. Besides, findings also identified reluctant attitude and criticism by seniors, lack of administrators' support, lack of resources (multimedia, projector), network issue, signal problem, slow Wi-Fi connection, lack of availability and accessibility of internet, lack of appropriate infrastructure, electricity issues and lack of content related with local language on internet were few of the challenges faced by university teachers for technology integration in pedagogy.

### **Recommendations:**

Study recommends that:

- The awareness sessions be arranged for teachers at all levels (primary, secondary and college and university) to update them about the needs of pedagogical shift from traditional teaching to new technological trends.
- Technology training must be organized for enhancing app-specific skills as well as technology integration hands-on training on the cutting-age technology integration in curriculum.
- Comprehensive technology related professional development programs be planned and executed frequently.
- It is recommended that classroom be equipped with updated infrastructure and teachers be provided proper support to integrate technology in teaching from management and institution.
- This study focused on effectiveness of technology training and technology integration in pedagogy therefore an extensive study is required to be conducted on technology integration in various educational dimensions.

## References

- Abbasi, W. T., Ibrahim, A. H., & Ali, F. B. (2022). Perceptions about English as second language teachers' technology based English language teaching in Pakistan: Attitudes, uses of technology and challenges. In *Proceedings of International Conference on Emerging Technologies and Intelligent Systems: ICETIS 2021 (Volume 1)* (pp. 314-325). Springer International Publishing.
- Hussain, S., Ahmad, M., Altaf, S., & Ahmad, M. F. (2023). Quality Education Sustainable Development (SDG-4) 2025: A Comparative Study of Government and Punjab Education Foundation Secondary Schools. *PJE, 40*(2).
- Akram, H., Aslam, S., Saleem, A., & Parveen, K. (2021). The challenges of online teaching in COVID-19 pandemic: A case study of public universities in Karachi, Pakistan. *Journal of Information Technology Education: Research, 20*, 263-282.
- Al-Awidi, H. M., & Aldhafeeri, F. M. (2017). Teachers' readiness to implement digital curriculum in Kuwaiti schools. *Journal of Information Technology Education. Research, 16*, 105.
- Amir, M., Hussain, S., & Muhammad, S. (2022). Identification of the need for teacher training at the primary school level. *International Research Journal of Education and Innovation, 3*(1), 165-176.
- Asad, A., Mehmood, S., Hussain, S., & Amir, M. (2023). Analysis of Risk Management in Higher Education Institution. *International Research Journal of Management and Social Sciences, 4*(3), 282-288.
- Asad, M. M., Hussain, N., Wadho, M., Khand, Z. H., & Churi, P. P. (2021). Integration of e-learning technologies for interactive teaching and learning process: an empirical study on higher education institutes of Pakistan. *Journal of Applied Research in Higher Education, 13*(3), 649-663.
- Aslam, B., Javed, I., & Khan, F. H. (2011). Uptake of Heavy Metal Residues from Sewerage Sludge in the Milk of Goat and Cattle during Summer Season. *Pakistan veterinary journal, 31*(1).
- Aslan, A., & Shiong, P. K. (2023). Learning in the Digital Age Full of Hedonistic Cultural Values Among Elementary School Students. *Bulletin of Pedagogical Research, 3*(2), 94-102.
- Beriswill, J. E., Bracey, P. S., Sherman-Morris, K., Huang, K., & Lee, S. J. (2016). Professional development for promoting 21st century skills and common core state standards in foreign language and social studies classrooms. *TechTrends, 60*, 77-84.
- Bryman, A., 2012. *Social Research Methods*. 4th ed. Oxford: Oxford University Press.
- Castro-Guzmán, W. (2021). Challenges of professional development for technology integration in higher education. *Cuadernos de Investigación Educativa, 12*(2), 82-99.
- Consoli, T., Désiron, J., & Cattaneo, A. (2023). What is "technology integration" and how is it measured in K-12 education? A systematic review of survey instruments from 2010 to 2021. *Computers & Education, 197*, 104742.
- Daniela, L., Visvizi, A., Gutiérrez-Braojos, C., & Lytras, M. D. (2018). Sustainable higher education and technology-enhanced learning (TEL). *Sustainability, 10*(11), 3883.



- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & education, 59*(2), 423-435.
- Fannakhosrow, M., Nourabadi, S., Ngoc Huy, D. T., Dinh Trung, N., & Tashtoush, M. A. (2022). A Comparative Study of Information and Communication Technology (ICT)-Based and Conventional Methods of Instruction on Learners' Academic Enthusiasm for L2 Learning. *Education Research International, 2022*(1), 5478088.
- Gewerc, A., & Segura-Robles, A. Arroyo-Cañada, FJ (2018). Are we ready for educational robotics? A survey on teacher training needs. *Computers & Education, 116*, 1-17.
- Gnambs, T. (2021). The development of gender differences in information and communication technology (ICT) literacy in middle adolescence. *Computers in Human Behavior, 114*, 106533.
- Guillén-Gámez, F. D., & Mayorga-Fernández, M. J. (2020). Identification of variables that predict teachers' attitudes toward ICT in higher education for teaching and research: A study with regression. *Sustainability, 12*(4), 1312.
- Hafeez, A., Hussain, S., Muhammad, S., & Hussain, S. (2023). Effect of pec exams on quality education in public and punjab education foundation funded secondary schools. *International Research Journal of Management and Social Sciences, 4*(3), 358-374.
- Irum, S., Munshi, P., Bhatti, T., & Awan, J. H. (2018). University Teachers knowledge about technological devices and their use: An Analytical study. *International Journal of Computer Science and Network Security, 18*(8), 74-80.
- Jogezai, N. A., Baloch, F. A., Jaffar, M., Shah, T., Khilji, G. K., & Bashir, S. (2021). Teachers' attitudes towards social media (SM) use in online learning amid the COVID-19 pandemic: the effects of SM use by teachers and religious scholars during physical distancing. *Heliyon, 7*(4).
- Lin, Y. S., Chen, S. Y., Su, Y. S., & Lai, C. F. (2017). Analysis of students' learning satisfaction in a social community supported computer principles and practice course. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(3), 849-858.
- Manacap, C., Tagaro, P. M., Cose, A., Tagaro, N., Larida, L., Chiu, D., ... & Ocha Jr, P. S. (2021). Appropriating technological pedagogical content knowledge of basic education teacher using online learning instruction. *International Journal of Multidisciplinary: Applied Business and Education Research, 2*(11), 1033-1042.
- Martins, J., Branco, F., Gonçalves, R., Au-Yong-Oliveira, M., Oliveira, T., Naranjo-Zolotov, M., & Cruz-Jesus, F. (2019). Assessing the success behind the use of education management information systems in higher education. *Telematics and Informatics, 38*, 182-193.
- Mohamad, M., Arif, F. K. M., Alias, B. S., & Yunus, M. M. (2020). Online game-based formative assessment: Distant learners post graduate students' challenges towards Quizizz. *International Journal of Scientific and Technology Research, 9*(4), 994-1000.
- Muir-Herzig, R. M., & Mulder, C. M. (2018). Technology integration in K-12 classrooms: A teacher perspective. *Journal of Educational Technology Development and Exchange, 11*(1), 1-14.

- Musarat, M. A., Irfan, M., Alaloul, W. S., Maqsoom, A., & Ghufuran, M. (2023). A review on the way forward in construction through industrial revolution 5.0. *Sustainability, 15*(18), 13862.
- Pakistan Ministry of Education (2018). National education policy 2018. Islamabad: Government of Pakistan.
- Rahiman, H. U., Panakaje, N., Kulal, A., & Parvin, S. R. (2023). Perceived academic stress during a pandemic: Mediating role of coping strategies. *Heliyon, 9*(6).
- Salam, M., Awang Iskandar, D. N., Ibrahim, D. H. A., & Farooq, M. S. (2019). Service learning in higher education: A systematic literature review. *Asia Pacific Education Review, 20*, 573-593.
- Sarhandi, P. S., Khan, I. F., Buledi, M. H., & Asghar, J. (2016). Integration of technology with pedagogical perspectives: An evaluative study of in-house CALL professional development. *Arab World English Journal (AWEJ) Special Issue on CALL, (3)*.
- Shrestha, S., Haque, S., Dawadi, S., & Giri, R. A. (2022). Preparations for and practices of online education during the Covid-19 pandemic: A study of Bangladesh and Nepal. *Education and information technologies, 27*(1), 243-265.
- Snezhko, Z., Babaskin, D., Vanina, E., Rogulin, R., & Egorova, Z. (2022). Motivation for Mobile Learning: Teacher Engagement and Built-In Mechanisms. *International Journal of Interactive Mobile Technologies, 16*(1).
- Suleman, Q., Aslam, H. D., Javed, T., & Hussain, I. (2011). Barriers to the successful integration of educational technology in teaching learning process at secondary school level in Khyber Pakhtunkhwa, Pakistan. *International Journal of Research in IT & Management, 1*(8), 97-119.
- Tahir, J., & Farooq, F. A. (2023). Globalization and Pakistan Educational System in 21st Century: Challenges and Proposed Action Plan. *Al-Mithaq (Research Journal of Islamic Theology), 2*(02), 18-33.
- Tanjung, S., Baharuddin, B., Ampera, D., Fariyah, F., & Jahidin, I. (2022). Problem based learning (PBL) model with technological, pedagogical, and content knowledge (TPACK) approach. *International Journal of Education in Mathematics, Science and Technology, 10*(3), 740-752.
- Teo, T. (2015). Examining pre-service teachers' perceived usefulness, ease of use, and attitude towards educational technology: A Malaysian perspective. *Journal of Educational Technology & Society, 18*(3), 274-285.
- Umar, Z., Sadiqi, T., Hussain, S., & Qahar, A. (2023). Compare the Quality of Infrastructure on Student Outcomes in Public and Punjab Education Foundation Funded Schools at Secondary Level. *International Research Journal of Management and Social Sciences, 4*(4), 26-39.
- Yeh, Y. F., Lin, T. C., Hsu, Y. S., Wu, H. K., & Hwang, F. K. (2015). Science teachers' proficiency levels and patterns of TPACK in a practical context. *Journal of Science Education and Technology, 24*, 78-90.
- Zaman, F. U., Muhammad, S., Hussain, S., & Qahar, A. (2023). Challenges and Risks for Higher Education Now and Beyond the 2030. *International Research Journal of Management and Social Sciences, 4*(3), 180-192.