

Teachers' Digital Competence and Interactive Teaching Practices in Academically Diverse Classrooms: Moderating Role of Principal's Support

Nadia Ibrahim¹, Dr. Najmonnisa Khan²

Abstract : During the last few years, the process and system of education have been facing continuous changes because of the emergence of Information and Communication Technologies (ICT). The digital competence of teachers has gained great importance and is now considered a challenge to be faced by teachers, so that they can adapt to the different technologies and incorporate them into their teaching practice. The present study is aimed to analyse the relationship between the digital competence of teachers and their interactive teaching practices. This study also examines whether a relationship exists between the principal's support and the interactive teaching practices of teachers. A quantitative survey was conducted for the collection of data. The participants of the study comprised of 100 teachers selected randomly from ten private schools of Karachi, Pakistan. The independent variable in this study is digital competence whereas the dependent variable is interactive teaching practices. Principal's support is also an independent variable which acts as a moderator in this study. The results showed that digital competence causes 45% change in the interactive teaching practice which means that there is a significant relationship between digital competence and interactive teaching practice. The result shows that the beta value is found to be 0.675 which means that the change in the digital competence by one unit will bring about the change in the interactive teaching practice by 0.675 units. The result of moderator variable shows positive relationship between principal's support and interactive teaching practice. In other words, we say that when principal's support will increase by one unit, the interactive teaching practice will increase by 0.440 units. The findings of this study also determine the importance of factors such as the qualification of teachers and their teaching experience.

Key words: *Digital Competence, Interactive teaching practices, Principal's support, Information and communication technology, Digital tools, Digital technology*

¹ Research Scholar at Department of Education, SZABIST, Karachi, Pakistan, nadiaibrahim409@gmail.com

² Associate Professor, Department of Education, SZABIST, Karachi, Pakistan, dr.najmonnisa@szabist.edu.pk

1. Introduction

During the last few years, teacher's digital competence has been given a lot of importance (Isoda et al., 2021). According to Devisa et al. ; (2023), digital competence constituted by skills, concepts, approaches, and behaviours. According to Kalentric et, al. (2017), digital technology has affected all aspects of our daily lives and has adjusted our ways to learn things, communicate with each other, find information, and gain knowledge. Developments in digital technology have been creating changes and have effects in the educational world (Alfiya et al., 2022). Digital technology involves the electronic devices and other resources that help in generating, storing, processing, and transmitting data by the use of digital signals, such as computers, smartphones, and the internet (Giones and Brem, 2017)

The digital technology has been included and blended in education due to the advancement in technological connectivity (Isoda et al., 2021). Teachers are becoming digitally competent because digital technology has done rapid growing transformations and changes which are evident at all levels of the system of education (Kalentric et, al. 2017). Developments in digital technology have been creating changes and have effects in the educational world (Alfiya et al., 2022). In this regard school's principal's role cannot be ignored. Researches support that there is a strong relationship between teachers' digital competency and Principal's support (Lennon, 2012; Philip, & Thinguri, 2022; Devisa et al, 2023; Nellitawati et al. ,2024). Leadership is not only limited with providing vision and setting the expectations for integrating technology in classroom teaching but also ensure required training and teaching learning resources for their staff and students (Devis et al, 2023; Nellitawati et al. 2024 ; Shapaka, 2025).

Digital technology has resulted in the interactive teaching practices making the learning process more engaging and interactive by utilizing different digital tools in the lessons, enabling active participation by pupils (Isoda et al., 2021; Philip, & Thinguri,2022; Nellitawati et al. , 2024). Pupils can show outstanding progress by using several digital tools and related means of technology (Alfiya et al., 2022), such as software, applications, platforms, and online resources (Njoki et al, 2016). Digital technology has also allowed the pupils to get involved in such interactive lessons in which they get real time-shared experiences irrespective of their location (Isoda et al., 2021). According to Devisa et al, (2023), leadership role is important to create a learning environment in schools. Leadership must be creative and

courageous and having a strong understanding of use of technology (Philip, & Thinguri, 2022) in teaching and it has an indirect effect on students' achievement and direct effect on teachers' use of technology (Nellitawati et al. 2024),. The findings are supported by Aisha and Zeema (2017). In their study they mention that when teachers become digitally competent and are able to practically incorporate ICT in the educational field, it enhances not only the quantity but as well as the quality which results in higher levels of productivity, efficacy, innovation and better outcomes for education. ICT includes the tools and resources used for creating, storing, transmitting, and managing information, involving the use of computers, the internet, and other digital technologies (Njoki et al, 2016).

The successful application of digital tools by teachers can be considered as a mean for the advancement in learning for pupils of all kinds, irrespective of their limitations to obtain information (Alfiya et al., 2022).

Digital competency helps in the facilitation of learning as well as instructional practices and its effect is found greatly at all levels of education (Aishah & Zeema, 2017). It is important that teachers become digitally competent and gain knowledge about the modern digital literacy, as proven by numerous studies (Alfiya et al., 2022). When teachers know and understand the need and importance of technology and they believe the ultimate value of digital technology, then there are more chances that they easily become digital competent and make use of digital tools into their teaching practice (Amhag et al., 2019). According to Aishah and Zeema (2017), with the constant use of digital tools and technology, the classrooms have been converted from traditional to modern classrooms. This transformation has resulted in a switch from the instructor-centered to pupil-centered teaching and learning process, which in turn facilitates and increases the understanding of the pupils and also helps them in the learning of advanced skills (Aishah & Zeema, 2017).

There can be many factors involved in the progress and improvement in a teacher's digital competency, whose knowledge will be beneficial in the making of future policies of education related to digital technology (Alfiya et al., 2022).

Koehler et al. (2013) states that teachers mostly have insufficient practical experiences while using technology because of lack of adequate and proper training. Amhag et al. (2019) states that there is a dire need in the improvement and progress of teachers' digital competency so that they become confident in the application of digital tools in the teaching profession. This also implies that the teacher educators should be able to train teachers in

becoming digitally competent so that they successfully can also perform well in online teaching and learning environment (Amhag et al, 2019).

When discussing digital competence, it includes the proper management and keeping updated of several digital devices as well as latest software available in the market and to have the command on the usage and application of these digital devices in an educational setting (Amhag et al, 2019). The UNESCO framework Media and Information Literacy Curriculum for Teachers also highlights the necessity and significance of nourishing and building up teachers' knowledge of digital technology (Amhag et al, 2019).

1.1 Problem Statement

Several studies have been done so far on the digital competence of teachers and the interactive teaching practice. It is found from the literature review that studies have recommended that there is a need for further researches to analyse the degree of digital competence of teachers at different levels of education. Studies have further recommended to do empirical studies to check the efficacy and success of digital resources and tools when they are applied in the teaching practice in the classroom. Keeping these recommendations and gaps in consideration, the researcher of this study has selected this topic for the research.

1.2 Objectives of the study

- To identify the relationship between teachers' digital competence and interactive teaching practices in academically diverse classroom
- To find out the relationship between Principal's support and teachers' interactive teaching practices in academically diverse classroom
- To evaluate the impact of teachers' digital competency (TDC) on interactive teaching practice (ITP) when principal support is provided to teachers.

1.3 Hypothesis:

- **H0 1** There is no relationship between teachers' digital competence and interactive teaching practices in academically diverse classroom

- **H0 2** There is no relationship between the Principal's support and teachers' interactive teaching practices in academically diverse classrooms?
- **H0 3** Principal support does not moderate the relationship between teachers' TDC and ITP.
- **H0 4:** There is no impact of TDC on ITP, even when principal support is provided to teachers

1.4 Significance of the Study

This study would help teachers to know about the importance of using information and communication technology in their teaching practice. One of the important feature of this study is that it collected the information about teachers' digital competence as well as their interactive teaching practices, which will help the researchers to know how a digitally competent teacher's lessons are unique and distinct than a teacher who is digitally less competent. This study also collected information regarding the support of the school principals provided to the teachers for the incorporation of information and communication technology in their lessons. This information will make the school principals and other leaders to know how important their indirect participation in the implementation of digitally oriented lessons is. This will help the leaders to critically reflect into their own attitudes and behaviours in aiding and helping out their teachers to work with the latest available digital tools available in the market.

2.Literature Review

A comprehensive literature review has been done to know about the analysis of the previous studies done in the same area. Definitions of the key words according to literature review are also provided.

Competence refers to the utilization of the skills and learning by facing the challenges and resolving the issues and problems in usual and unusual conditions of life (Kalentric et al., 2017). Competence includes the understanding, and the ability to do critical thinking and self-reflection (Kalentric et al., 2017).

Digital competence refers to assured, creative and innovative utilization of ICT for the achievement of goals which are linked with job, employment, studying, comfort, or living in a society (Kalentric et al., 2017). Digital competence is defined as the secure, interpretative and innovative application of digital tools and software to fulfil the goals of work,

job, business, hobby, or to actively participate and contribute in a society (Masami Isoda, 2021).

Digital resources means all the digital materials which are utilized in the process of learning and teaching. In this context, the term ‘digital resources’ refers to represent digital technology, and digital materials related to learning and teaching (Kalentric et al., 2017).

Digital technology means services which can be applied in the communication process as well as in the process to collect, organise, store, produce and secure the content and information saved in digital form. Some of the tools include PCs, tablets or interactive boards etc. (Kalentric et al., 2017).

Teachers’ digital competence is defined as a blend of skills and capabilities due to which enough application and incorporation of digital tools in the form of pedagogical resource, applied into the teaching–learning process, therefore changing information and communication technology into Learning and Knowledge Technology with a educational application (Romero-García et al., 2020).

2.1 Digital Competence

Digital competence is considered as important and basic level of skill as other literacy skills such as reading, writing, numeracy and oral presentation (Ottestad, 2013). Digital competence includes the confident and critical use of Information and communication Technology (ICT) to work smarter (Spante et al, 2018). Isoda et al. (2021) states that digital competence is now considered as a universal competence along with the other skills of the 21st century. Kalentric et, al. (2017) also states that digital competence is linked to the ‘21st Century skills’, which is considered to be learned by all people to make sure they actively take part in the activities of a society and contribute to the economy.

Alfiya et al. (2022) in their research proves that the teachers lack a great level of digital competence especially in a diverse classroom with pupils who have different characteristics and needs. Artacho et al. (2021) says that if we look from the broader perspective of education, digital technology has become far more than a support tool for teaching in the classroom, instead it is now an undetachable element form the current pedagogical system. The potential to use technology will make sure that the technology is utilized effectively and efficiently, which will make sure that the currently working teachers and the people who want to become teachers should be well aware of the present issue (Alfiya et al., 2022).

Isoda et al. (2021) have classified the concept of digital competence into the following three areas of education and knowledge: social awareness, technological competence and pedagogical compatibility. Due to the sudden rise of the technological tools, it has been very difficult and challenging for the teachers to adapt to new methodologies for which they are not previously trained and also which is not so normal for them (Artacho et al., 2021). Teachers have to upgrade their knowledge and methodological skills so that they can easily incorporate the latest digital tools into their lessons (Artacho et al., 2021).

There is a clear difference between the pedagogical application of digital technology by teachers and the use of digital technology by other professions (Isoda et al., 2021). The capability and expertise in the usage of digital tools professionally by teachers suggests quality pedagogical-didactic judgement as well as recognition of the suggestions of the use of digital technology by students for their active learning (Isoda et al., 2021)

Romero-García et. al, (2020) states that the connection among content, pedagogy and technological knowledge (T-PACK), is the root of interactive teaching practice, making the use of digital technology. Teachers' digital competence is the teacher's capability and skill to use ICT professionally with great pedagogical and technological judgement and information of the implications for learning activities and pupils' digital training (Carmen Romero-García et. al, 2020).

2.2 Interactive teaching practice

Interactive teaching practices are strategies used in a classroom by teachers to make the lesson interactive and to keep the students involved (Santhamarai, 2018). For the past couple of years, the implementation of digital technology in the field of education has been increased by the increased supply of connectivity, which resulted in the involvement of interactive teaching practice and learning activities by using the facility of internet, therefore facilitating online and digital participation of students (Artacho et al., 2021).

Teachers who improve their digital competency are able to support diverse interactive practices for creating interactive community for pupils as well as, are able to link the academic goals with the platforms of the real-world (Tohara et, al., 2021).

Akbar, (2016) states that there are several teaching strategies and approaches in which the classrooms have multiple digital tools and technological facilities which include, laptops, or desktops and other hand-held digital devices. Other digital tools may include Projectors in the classrooms where screen can easily be displayed and the teacher can teach the

lesson easily by sharing notes on screen (Akbar, 2016). Schools which facilitate the use of digital tools encourage collaborative learning by using computer-based tasks (Akbar, 2016). Modern technology has also enabled teachers to deliver their lectures outside the classroom by using flipped class strategy of teaching (Bergmann & Sams, 2012). Akbar (2016) says that such digital oriented teaching strategies have shown greater pupil-instructor interaction, thus resulting in improved quality of education.

2.3 Principals' support

Principal's support is the facilitation provided by the school Principals to their teachers in order to make the teaching and learning effective (Gallagher, 2012). The most important factor in the incorporation of digital technology in the classroom is the school management and administrative support provided by school Principals, as mentioned by Isoda et al. (2021). There is a need for more administrative and technical support to school teachers to solve the problems faced by the teachers in the practical implementation of their digital competencies in the pedagogy to make lessons interactive for students (Isoda et al., 2021).

Claro et al. (2017) states in research that all institutions have a variety of sub-cultures and they have a diverse range of interests which affects the overall school processes and practices. According to Howard et al. (2015), the administration and the school principal's behaviour and belief system with respect to the importance and use of digital technology greatly affects the implementation of a new technology in the school. There are basically two basic cultures in the system of a school, one of which is the academic while the other is the administrative where the school principal is the main focus (Claro et al. 2017). Both these cultures vary in their logics as well as their way to influence the processes and activities of school (Claro et al. 2017). The interaction between the school principal and teachers is very important in the integration of ICT in education (Peterson et al., 2014).

Chang (2012) mentions that there are several evidences which prove that the school principals who show a positive attitude towards the integration of technology, know very well the importance of technology for their school tasks and projects, and also support their teachers and lead them in the incorporation of technology in their teaching practices.

The most dominant logic and point of view for the school principals and other administrative staff is that of efficiency. The school management plays a vital role in building up a creative environment for the success of the school and their engagement is essential for the sustainability of technology with the passage of time (Claro et al., 2017).

The process of rapidly growing technology is generating new challenges for teachers' pedagogical methods, development of digital competence of students and teachers as well as development of their specialised skills and knowledge (Marijana Kalentric et al., 2017).

Research proves that pupils show positive attitude in using technology in the classrooms (Hussien Alakrash et, al., 2021).

To highlight the need for creating changes in the field of education with respect to digital environments, a reference framework is needed for providing the support and encouragement for the digital competencies of school teachers. The Common Digital Competence Framework for Teachers by INTEF (2017), is one of such frameworks, which presents 21 competencies which have been taken from two European digital competence frameworks (digital competence framework for people and digital competence framework for teachers) (Masami Isoda et. al, 2021).

According to Esther Garzon-Artacho et al. (2021), digital competence is a multidimensional competence having the potential to activate the set of skills which enables a person to seek, select, gain and process the information with the use of information and communication technology to convert this information into knowledge and also making use of different digital tools to solve different problems.

Creating an innovative teaching as well as learning environment for pupils which makes use of interactive and collaborative teaching materials is essential for better understanding of pupils as well as their improved performance (Abdul Jalil Toha Tohara et, al., 2021).

Pradip Dhungel, (2020) revealed that some of the mathematics teachers made use of digital technology in their classroom practices which resulted in the innovative and interactive lessons by making pupils active learners through their active participation.

Julio Cabero-Almenara et, al. (2021) have found the level of interest of students towards ICT integration and e-learning materials and found that pupils can study more effectively using digital tools, which also help teachers in their process of teaching. Although digital competence of students is focused and is officially documented in the policies, conceptualization about the teachers' literacy and competence for the encouragement and promotion of pupils to take part in a digitally-oriented community is downgraded and excluded at all (Ewa Skantz-Åberg et al., 2022).

A supposition that has been explained says that the importance and stress on the digital competence with respect to the teaching profession are more extensive, complicated as well as challenging as compared to any other profession (Ewa Skantz-Åberg et al., 2022). Digital competence, for educators and teachers, involves not only to be able to adopt the technology themselves, but also to consider and reflect on different points of views on the usage of technology with respect to instructions and education keeping in view the perspective of the students ((Ewa Skantz-Åberg et al., 2022).

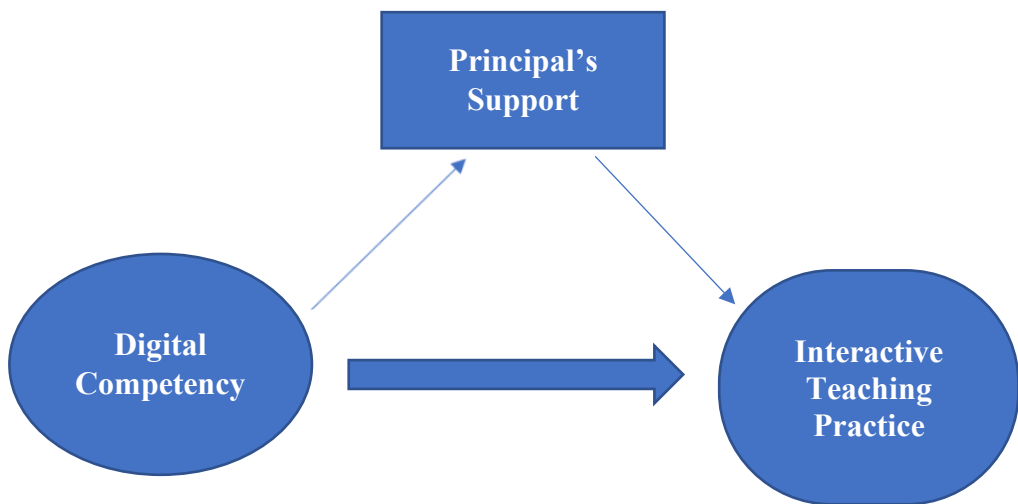
Technology has to be learned by people to make sure that they actively and successfully participate in their community and society and also contribute in the world economy (Isoda et. al, 2021). Studies prove that digital competence for the purpose of pedagogy is not satisfactory and not all teachers are properly digitally competent (Lisbeth Amhag et al, 2019). Furthermore, advanced methods should be incorporated to solve these problems since they have a significant role in the professional development of teachers so that they can become digitally competent and can easily implement information and communication technology in their profession of teaching (Karstein, 2015). There is a dire need to grow technology professionally through intense training so that teachers can utilize their technological skills in a better way by properly understanding them and applying their knowledge in the right way (Lakkala & Ilomaki, 2015). The command on digital competency is essential when society and communities are digitalizing and new forms and of media are blended in our daily life activities (Lakkala & Ilomaki)

2.4 Conceptual Framework

The conceptual framework is based on the theory of Technology Acceptance Model (TAM). The Technology Acceptance Model (TAM) is the key model in understanding predictors of human behaviour towards potential acceptance or rejection of the digital technology (Granic and Marangunic, 2019). TAM has two core variables which are perceived ease of use and perceived usefulness. These variables are known to be the key factors affecting acceptance of learning with technology (Granic and Marangunic, 2019). It is a simple model of IT adoption which claims that the overall IT and digital competencies are based on users' beliefs like (a) system's perceived usefulness (PU) and (b) systems' perceived ease-of-use (PEOU) (Nair and Das, 2012).

According to the theory of TAM, understanding of the ICT, increases acceptance to use the technology at workspace and daily life. If leader has better understanding of use of ICT so he/ she can make better decision to include ICT skills in teaching learning environment. Based on his/her

understanding of integration of ICT in Education, leaders arrange trainings for teachers and equip them with latest knowledge and resources. The leaders' support encourages teachers to perceive ease of use and usefulness, thus promoting acceptance of technological innovation and integration, resulting making their teaching more interactive (Davis, 1989). The conceptual framework of this present study is to get the insights of the relationship between digital competence of teachers and their interactive teaching practice with the principal's support as a moderator.



3. Methodology

The study employed quantitative research and causal comparative research design for data collection from the respondents (Patricia L. Busk, 2005). The participants of the study comprised of 100 teachers of private schools of Karachi, Pakistan, selected randomly from ten private schools. The teachers who participated in this study are primary, middle school as well as secondary school teachers. The participants are selected from 5 private schools of Karachi so that variation could be found.

Simple random sampling technique is applied by taking data from the teachers of three systems of schools. Survey method was used as the technique to collect data in this research. Questionnaire used consists of three scales. The first scale is of 'Digital competence' comprising of 20 items has been adopted from (Käck, & Männikkö Barbutiu, 2012).. The second scale consists of 15 items regarding 'Interactive teaching practice

Practices has been adopted from (Ferry et al., 2004, March). The third scale is regarding 'Principal's support' is adopted from Tołwińska (2021).

For the analysis of the data, SPSS statistical software was used. First the descriptive statistics were calculated in order to know the demographics and frequencies of participants. Then Regression and correlation tests were applied to analyse the data and check the relationship between the independent variable and the dependant variable.

Ethical consideration contains confidentiality as well as autonomy of the participants which is extremely important for a research study (Cohen et al, 2011). Study was approved by departmental ethical review committee. To ensure the credibility of the research, nature of the study was explained to the participants and permission for the collection of data was taken from them. Before getting the questionnaire filled, the consent of the participants was taken and the questionnaire was shared with them. The participants were taken into confidence and were promised that their responses will not be used for any other purpose, which means the data collected for this research will not be utilized for any other research.

4.Results and Findings

Table 4.1: Relationship between teachers' TDC and ITP

		DIGITAL_ COMPETE NCE	INTERACT IVE_TEA CHING
DIGITAL_COMPETE NCE	Pearson	1	.675**
	Correlation		
	Sig. (2-tailed)		.000
INTERACTIVE_TEA CHING	N	100	100
	Pearson	.675**	1
	Correlation		
	Sig. (2-tailed)	.000	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.1 displays the results of correlation between TDC and ITP. The value 0.675 informs the positive correlation between digital competence interactive

teaching practice. This value 0.675 shows that there is moderate strong positive correlation.

The significant value is 0.000, which is less than 0.05, which shows that the correlation is statistically significant. Therefore the null hypothesis is rejected.

Table 4.2: Correlation between Principal's support and ITP

		PRINCIPAL's SUPPORT	INTERACTIVE_TEACHING
PRINCIPAL's SUPPORT	Pearson Correlation	1	.850**
	Sig. (2-tailed)		.001
	N	100	100
INTERACTIVE_TEACHING	Pearson Correlation	.850**	1
	Sig. (2-tailed)	.001	
	N	100	100

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4.2 displays the results of the correlation between the Principal's support and ITP. The value 0.850 informs the positive correlation between Principal's support and ITP. The value 0.850 shows that there is a strong positive correlation. The significant value is 0.001, which is less than 0.05, which shows that the correlation is statistically significant. Therefore, the null hypothesis is rejected.

Regression Analysis

Table 4.3: Regression Results

Model	R	R Square	Adjusted Square	Std. Error of the Estimate
1	.675 ^a	.456	.450	7.64002

a. Predictors: (Constant), DIGITAL_COMPETENCE

b. Dependent Variable: INTERACTIVE_TEACHING

Table 4.3 informs about the impact of TDC on ITP. It shows that TDC significantly impact on the interactive teaching practice. The value of R-Square is 0.456 which means that TDC causes 45% change in ITP. Therefore the null hypothesis is rejected.

Moderation Analysis

Table 4.4 Moderation Analysis, Model Summary-Moderation

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.756 ^a	.572	.558		6.84761

a. Predictors: (Constant), Interactive, DIGITAL_COMPETENCE, PRINCIPAL_SUPPORT

As indicated in Table 4.4 informs that the principal's support is highly effective, which improves the teachers' interactive teaching practice on ITP from 45.6% to 57.2%. There is a 12% increase in improvement in ITP with the Principal's support compared to no support from the principal. Therefore, the null hypothesis is rejected.

5.Discussion

The results of the present study clearly show that a correlation exists between the teachers' digital competency and the interactive teaching practice. This finding is in relation to one of the research studies, which states that the current educational system needs teachers to have digital attitudes and skills that allow them to perform dynamic and appropriate work for students who require current and innovative teaching ([Cabero and Gimeno, 2019](#)).

Esther Garzon-Artacho et al. (2021) also state a similar finding that the recent educational situation and system demand teachers to be digitally competent and smart enough to work with the digital tools and perform appropriate teaching practices involving interactive activities for students.

All these evidences from the literature review prove to be true from the current study. The results of this study shows that the correlation also exist between the principal's support which the moderator variable and the interactive teaching practice. It means that the principal's support which is the moderator variable in this study has positive relationship with the teachers' interactive practices.

The results further proves that this existing correlation between the two variables is increased when the principal's support is also provided to the teachers. This result is also evident from other researches. Polizzi (2011) says that the teachers are unable to incorporate ICT successfully in the classroom if the principals do not provide adequate and enough support to the teachers with respect to the implementation of technology.

Many researchers agree on the theory that leadership plays a significant role in the integration of ICT in classrooms (Polizzi, 2011). Principals should support the teachers' participation in the implementation of ICT by providing them training so that the teacher can contribute in the active learning process of students (Polizzi, 2011).

This study also discusses the different digital tools used by the school teachers in their classrooms to make their lessons interactive. Digital tools like Google classroom where teachers can post the work and all students may share their work is frequently used by school teachers who are digitally competent. Science teachers make use of simulation to show different experiments to the pupils through online mode. Teacher participants in the present study also shows the use of Kahoot which is another digital tool for creating online quizzes. Video presentations, multimedia and padlet are the other digital tools which are normally used by teachers in this study. Moreover interactive quizzes and online puzzles are also frequently used by teacher participants of this study. Similar studies are evident from the literature review which discusses the use of digital tools for interactive teaching practice.

Estrella et al. (2018) states that modern communities and society need changes and innovation in the practices of the school system and modern methods of teaching should be included in the provision of teaching strategies which make use of digital technology. Akbar (2016) states that interactive teaching activities include use of multimedia, simulations, animations, visualization, and online assessment through different digital and technological tools have improved the process of learning of students.

The present study is conducted only in 10 private secondary schools of Karachi, Pakistan. The teachers which are included in this study belong to the elite and well-known Private schools of Karachi, Pakistan. So the data is collected on the basis of their responses only. The study does not cover any teacher from any public school of Karachi. So the relationship of digital competence of teachers and their interactive teaching practice cannot be generalized. This is also a recommendation for future researches that similar studies are needed to be performed by the researchers on the public sector

schools so that insights can be obtained about the public sectors teachers' digital competency and their use of interactive teaching practice.

6.Conclusion

In the current situation of the world, when technology has taken over almost everything, the system of education need teachers who are digitally competent. Teachers should also be able to integrate the latest and trending technological tools and resources into their teaching practice to facilitate and promote high quality teaching. The pupils are technology savvy now a days and teachers need to upgrade their knowledge with respect to today's pupils, who make use of technology in their daily life activities. It is highly suggested that there is need to promote a proper digital training of teachers, which will help them to become updated with the current education system. Teachers need to make the most of the latest digital tools in their teaching practices so that they can create a learning environment which is digitally oriented and also increase the students' interest in the learning process. It is also important to promote training in ICT at all levels of education system because the pupils are now more tech-savvy and easily adapt to technology.

Therefore, the teachers need to be encouraged in using the digital technology and related tools and maximum resources should be provided to support the teachers in the overall teaching and learning process.

In this way, this research has shown a descriptive approach of digital competency and interactive teaching practices. The results clearly shows that if teachers are digitally competent, then they will create more interactive learning environment for students by incorporating interactive teaching practices in classrooms. In addition, this research present some factors involved in the development of these constructs that may be of interest for further analysis in subsequent research. We are aware that this study presents a small sample of 100 teachers and, therefore, the results cannot be generalized.

For future lines of research, it can be stated that there is a dire need to continue studying and researching about the various perspectives of the digital competence of teachers. It suggests that there is a need to promote empirical researches in this line and to verify the effectiveness of digital tools when these tools are applied in into practice in the classroom.

References

- Akbar, M. (2016). Digital technology shaping teaching practices in higher education. *Frontiers in ICT*, 3, 1.
- Amhag, L., Hellström, L., & Stigmar, M. (2019). Teacher educators' use of digital tools and needs for digital competence in higher education. *Journal of Digital Learning in Teacher Education*, 35(4), 203-220.
- Asad, M. M., Hussain, N., Wadho, M., Khand, Z. H., & Churi, P. P. (2020). 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*.
- Blau, I., & Shamir-Inbal, T. (2017). Digital competences and long-term ICT integration in school culture: The perspective of elementary school leaders. *Education and Information Technologies*, 22(3), 769-787.
- Cabero-Almenara, J., Guillén-Gámez, F. D., Ruiz-Palmero, J., & Palacios-Rodríguez, A. (2022). Teachers' digital competence to assist students with functional diversity: Identification of factors through logistic regression methods. *British Journal of Educational Technology*, 53(1), 41-57.
- Claro, M., Nussbaum, M., López, X., & Contardo, V. (2017). Differences in views of school principals and teachers regarding technology integration. *Journal of Educational Technology & Society*, 20(3), 42-53.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.
- Devisa, M., Matin, M., & Ahmad, M. (2023). Improving Teacher Digital Literacy Competence Through Principal Leadership. *EDUTEC: Journal of Education And Technology*, 6(4), 629-640.
- Dhungel, P. (2020). *Accessibility and Practice of ITC in Teaching and Learning Mathematics* (Doctoral dissertation, Department of Mathematics Education).
- Erişti, S. D. B., Kurt, A. A., & Dindar, M. (2012). Teachers' views about effective use of technology in classrooms. *Turkish online journal of qualitative inquiry*, 3(2), 30-41.
- Ferry, B., Kervin, L., Cambourne, B., Turbill, J., Puglisi, S., Jonassen, D., & Hedberg, J. (2004, March). Online classroom simulation: The next wave for pre-service teacher education. In *Beyond the comfort zone: Proceedings of the 21st ASCILITE Conference* (pp. 294-302). Perth: Australian Society for Computers in Learning in Tertiary Education.

- Gallagher, M. (2012). How principals support teacher effectiveness. *Leadership*, 41(3), 32.
- Garzón-Artacho, E., Sola-Martínez, T., Romero-Rodríguez, J. M., & Gómez-García, G. (2021). Teachers' perceptions of digital competence at the lifelong learning stage. *Heliyon*, 7(7), e07513.
- Ghavifekr, S., & Rosdy, W. A. W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International journal of research in education and science*, 1(2), 175-191.
- Ghavifekr, S., Kunjappan, T., Ramasamy, L., & Anthony, A. (2016). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. *Malaysian Online Journal of Educational Technology*, 4(2), 38-57.
- Giones, F., & Brem, A. (2017). Digital technology entrepreneurship: A definition and research agenda. *Technology innovation management review*, 7(5), 44-51.
- Gogtay, N. J., & Thatte, U. M. (2017). Principles of correlation analysis. *Journal of the Association of Physicians of India*, 65(3), 78-81.
- Granić, A., & Marangunić, N. (2019). Technology acceptance model in educational context: A systematic literature review. *British Journal of Educational Technology*, 50(5), 2572-2593.
- Gudmundsdottir, G. B., & Hatlevik, O. E. (2018). Newly qualified teachers' professional digital competence: implications for teacher education. *European Journal of Teacher Education*, 41(2), 214-231.
- Isoda, M., Estrella, S., Zakaryan, D., Baldin, Y., Olfos, R., & Araya, R. (2021). Digital competence of a teacher involved in the implementation of a cross-border lesson for classrooms in Brazil and Chile. *International Journal for Lesson & Learning Studies*.
- Kelentrić, M., Helland, K., & Arstorp, A. T. (2017). Professional digital competence framework for teachers. *The Norwegian Centre for ICT in education*, 134(1).
- Käck, A., & Männikkö Barbutiu, S. (2012). *Digital kompetens i lärarutbildningen: ett integrationsperspektiv*. Studentlitteratur AB.
- Lefebvre, S., Samson, G., Gareau, A., & Brouillette, N. (2016). TPACK in elementary and high school teachers' self-reported classroom practices with the interactive whiteboard (IWB). *Canadian Journal of Learning and Technology/La revue canadienne de l'apprentissage et de la technologie*, 42(5).
- Lennon, L. (2012). The role of the school principal in technology integration: A literature review.
- Masalimova, A. R., Erdyneeva, K. G., Kislyakov, A. S., Sizova, Z. M., Kalashnikova, E., & Khairullina, E. R. (2022). Validation of The Scale

- on Pre-Service Teachers' Digital Competence to Assist Students with Functional Diversity. *Contemporary Educational Technology*, 14(4), ep382.
- Nailufar, R., Imaddudin, S., & Muttaqin, R. Z. (2023, May). THE PRINCIPAL'S ROLE IN IMPLEMENTING DIGITAL LITERACY IN SCHOOL. In *PROCEEDING OF INTERNATIONAL CONFERENCE ON EDUCATION, SOCIETY AND HUMANITY* (Vol. 1, No. 1, pp. 524-532).
- Nair, I., & Das, V. M. (2012). Using Technology Acceptance Model to assess teachers' attitude towards use of technology as teaching tool: A SEM Approach. *International Journal of Computer Applications*, 42(2), 1-6.
- Nellitawati et al. (2024), The Effect of Principals' Instructional Leadership and Digital Literacy on Teachers' Performance, Educational Administration: Theory and Practice, 30(1), 373-381, Doi: 10.53555/kuey.v30i1.1651
- Njoki, M. M., Wabwoba, F., & Micheni, E. M. (2016). ICT definition implication on ICT career choice and exclusion among women. *Information Technology and Computer Science*, 5, 62-71.
- Ottestad, G. (2013). School leadership for ICT and teachers' use of digital tools. *Nordic Journal of Digital Literacy*, 8(1-2), 107-125.
- Petersen, A. L. (2014). Teachers' perceptions of principals' ICT leadership. *Contemporary Educational Technology*, 5(4), 302-315.
- Philip, J. M., & Thinguri, D. R. (2022). Influence of Principals' Digital Communication Literacy on ICT Integration Management Outcomes in Public Secondary Schools in Kitui Central Sub County, Kenya. *African Journal of Education and Practice*, 8(2), 30-40.
- Rodríguez Moreno, J., Agreda Montoro, M., & Ortiz Colon, A. M. (2019). Changes in teacher training within the TPACK model framework: A systematic review. *Sustainability*, 11(7), 1870.
- Senthamarai, S. (2018). Interactive teaching strategies. *Journal of Applied and Advanced Research*, 3(1), S36-S38.
- Shapaka, R. K. (2025). The Effect of Principals' Instructional Strategies on the Academic Performance of Teachers. *European Journal of Human Resource Management Studies*, 8(2).
- Skantz-Åberg, E., Lantz-Andersson, A., Lundin, M., & Williams, P. (2022). Teachers' professional digital competence: an overview of conceptualisations in the literature. *Cogent Education*, 9(1), 2063224.
- Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent education*, 5(1), 1519143.

Tołwińska, B. (2021). The role of principals in learning schools to support teachers' use of digital technologies. *Technology, Knowledge and Learning*, 26(4), 917-930.