Digital Literacy as an Essential Teacher Competency

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Abstract:

In this 21st century education system Digital literacy is an essential component for digitalization of Education and professional competencies. Digital literacy includes teacher competency of classroom practices, student assessment and student learning outcome to professional development. Digital literacy cannot be misunderstood only as digital tool it also the inclusion of ethical awareness, critical thinking and pedagogical integration. This research paper mainly shed light on the importance of digital literacy as an essential skill for teachers along with its theoretical formation and conceptual base. Models like TPACK, DigCompEdu and UNESCO ICT Competency Framework are included to discuss how digital literacy creates efficacious and productive teaching practices during futuristic learning contexts. This study includes the main challenges related to insufficient professional development, regional disparities along with resistance to change attitudinal issues. Strategic recommendations for teacher preparation and professional development have beautifully knitted to deal with evolving ultimatum of digital system in education which is crucial for teacher education institutions and policy makers. The main findings of this study emphasize that effective digital literacy of teachers always helps to improve students' learning outcomes, educational equity and teacher's own professional growth. Digital literacy and digital transformation both are a part of systematic process where institutional support and supportive policy are indispensable.

Keywords: Digital literacy, teacher education, teacher competency, TPACK, DigComEdu.

Introduction

Digital technologies have completely pervaded the aspect of contemporary education by transforming the knowledge production to access and communication process. Presently various learning management systems, online assessment tools, collaborative online approach and effective Artificial intelligence tools are the regular routine for teaching learning process across the globe (Bond et al., 2020; OECD, 2021). As a consequence Teachers are not just remain as content delivery during teaching but their role is to use digital tools effectively and use them meaningfully in pedagogy and they must aware about ethical concern and use technology appropriate ways. All these improvements in the field of education have amplified long-term debate related to teachers' own professional development and

competency. Teaching is never been a purely technical activity: it is the inclusion of responsiveness towards learners in related context (Darling-Hammond et al., 2017). In such digital environment teachers must understand and navigate the new issue of data privacy to digital inclusion and information credibility while supporting their own students and well-being as well (Selwyn, 2016).

In this special context digital literacy has become one of main competencies of teachers. As per the international frameworks digital competency for teachers as remain prerequisite for both equity and educational quality (European Commission, 2018; UNESCO, 2018). In this digital environment and society, the OECD emphasizes on digital competency is an essential skill for teachers to prepare learners and future teachers as digitally competent. Mostly research suggesting about digital literacy as an important capability for teachers to produce and design such learning environment to mitigate diverse learners, create inclusive learning and develop higher-order thinking skills (Krumsvik, 2014; Redecker, 2017).

Despite all the factors digital literacy remains as inconsistent addressed among teachers and within teacher education. Till now it is considered as technical skill and tool-based training. But it is necessary to use this competency as core professional knowledge instead of just merely as simple training (Instefjord & Munthe, 2017; Tondeur et al., 2017). This type of approach might prioritize operational competence but not concern about contextual sensitivity or ethical concerns. As a result, teachers could acquire basic technical skill and knowledge without any such transformative knowledge (Ertmer & Ottenbreit-Leftwich, 2010).

Different research has been published in Teaching and Teacher Education where it has been stated that teacher competency is always be rational and closely tied with their professional identity. Teachers' rational practices are shaped by their main values, beliefs, culture and policies along with knowledge and skills (Gudmundsdottir & Hatlevik, 2018). With this context digital literacy can be considered as professional capacity that develops by their own experience and reflection upon their work along with mixing of professional communities.

This study shed light on critical examination of digital literacy as an essential teacher competency with the exploration and its implications for teacher education. This paper aims to continue in three different stages. First it studies the concept then analyzes all the theoretical frameworks and finally reflects on the relation between digital literacy and teaching practice. With this analysis this study focuses on reframing of digital literacy as the most effective component in teaching profession in 21st century digital era.

Literature review:

Digital literacy is the most important requirement in this present 21st century. This study suggests that teachers are having moderate level digital skill and lack advanced competency. Continuous professional development is required for strengthening digital competencies among teachers (Basilotta-Gómez-Pablos et al., 2022).

This Research mainly shed light on role of digital literacy for the preparation of teachers to deal with modern educational environments. In this scenario TPACK framework is helpful

for understand the effectiveness of technology and pedagogical integration. This study also mentioned about strengthening teacher preparation program for further development of digital teaching capabilities (Zhang et al., 2025).

The core of this study is to understand and evaluate teacher digital competency its important to assess teacher digital literacy. Studies stated that innovative teaching practices have been overlooked. Digital literacy development is crucial to assess and further strengthen digital literacy (Çebi & Reisoğlu, 2022).

Digital literacy significantly influencing the professional performance of teachers. This study has stated that teachers are having strong digital literacy are much more effective in real life classroom situations. Institutional support and infrastructure both are equally influence on teachers' professional growth and workplace competency (Tabieh et al., 2021).

Various professional development programs and courses play crucial role for the improvement of teacher digital competency. Reflective practices and collaborative learning both are essential in the training for the both professional development as well as digital competency (Zhang et al., 2024).

The trends of doing research on teacher digital literacy are a kind of focus shifting from technical skills to multidimensional competencies of teachers. Many recent research highlight that digital ethics and data-driven teaching practices are the most crucial in this digital world (Li & Chen, 2025).

Digital literacy is inclusion of the multidimensional concept of technological, pedagogical ad ethical components. This study suggests that digital literacy is not just technical proficiency rather inclusion of both the critical thinking and ethical usage skill (Starkey, 2020).

Digital literacy is the most important 21st century teaching skill that involves the student engagement to classroom communication to collaboration. The training of digital literacy is essential in teacher education program to deal with future educational challenges (Azmi et al., 2024).

Research indicates that digital competency is the inclusion of teachers' attitude, belief, knowledge and skills for the effective technology usages. Evaluation helps to understand the digital competency level of teachers for further training and improvement (Cabero-Almenara & Palacios-Rodríguez, 2020).

Studies suggests that the support of institutions, teachers self-efficacy along with the access of digital tools conjugally playing role for positive improvement of digital literacy. For the improvement of teaching effectiveness it is necessary to include digital competency training (König et al., 2020).

Objective of the study:

1. To understand the concept of digital literacy in the context of teacher education.
2. To know the theoretical framework of digital literacy.
3. To understand the relationship between digital literacy and teaching practice and professional development.

4. To know the process of implication of digital literacy skills in both pre and in service teaching.
5. To know the challenges and provide suggestions for strengthening digital literacy for teachers competency.

Research methodology:

This study based on scholarly research papers on digital literacy. Conceptual research design has been adopted for the implementation of the study. Secondary data collection method has been adopted from peer-reviewed journal and policy documents.

Conceptualizing Digital Literacy in Education

The concept of digital literacy is evolving with time. Early concept was related to technical skill that limited to the emergence concept of technical and personal computing skill. Gilster (1997) mentioned about the old definition that describing digital literacy is only about to use information from different digital resources. Eshet (2004) stated that the concept of digital literacy is the combination of technical, cognitive and socio-emotional skill to work in digital atmosphere. Bawden (2008) also stated that digital literacy is an umbrella term where information, media, visual literacy are included. All these point of views mainly emphasized the critical evaluation and ethical concerns instead of jus as mere tool alone.

From socio cultural perspective it can be said that literacy is socially situated practice which is shaped by related context and cultural norms (Lankshear & Knobel, 2011). With this context of digitalization that it can be stated that digital literacy needs participation in digital culture and communities. In case of teachers digital literacy is not just about individual attribution instead it is professional practice with the institutional expectation and policy and curriculum framework. In the matter educational research digital literacy is considered as multidimensional along with pedagogically implanted. Ng (2012) has been proposed a framework which is the integration of technical, cognitive and socio-emotional dimensions. Teachers' decision about technology mainly pedagogical includes the considerations of goals, learner needs, and various instructional strategies (Ertmer & Ottenbreit-Leftwich, 2010). International organizations like UNESCO's ICT Competency Framework for Teachers have made more advanced pedagogically grounded formulation of teachers' digital literacy. Digital competency is the most integral part of professional practice with curriculum development and assessment (UNESCO, 2018). In addition to these the European Commission's DigCompEdu Framework stated that digital competency including six areas from professional engagement to digital resources, learner assessment, process of teaching and learning, empowerment of learner along with facilitating learners' digital competency (European Commission, 2018; Redecker, 2017).

All these frameworks mainly focus on the progression, reflection and teachers' professional growth rather just static skill development. They have given various suggestions on digital literacy development over the time by practice and professional learning. In addition to these they also stated about various ethical considerations regarding usage awareness to data protection and digital inclusion as well.

Theoretical Frameworks informing Teachers' Digital literacy

Theoretical framework is playing an important role for shaping digital literacy enacted within teacher education. Technological Pedagogical Content Knowledge framework is one of the most influential is developed by Mishra and Koehler in 2006 (TPACK) for effective technology integration of content, pedagogical and technological knowledge. This framework has given direct challenge about the view of technology integration without reshaping the main content and pedagogy. Research has elaborated that teacher with strong TPACK are better to use technology in more innovative way in learner-centered environment (Koehler & Mishra, 2009; Voogt et al., 2013). The studies that related to TPACK highlights that digital literacy gives clear understanding about how technology helps to make the subject matter representation effectiveness and various pedagogical approaches for innovative method. On the other hand The DigCompEdu framework offering competency based model which positively supports professional development along with self-assessment (Redecker, 2017). It also helps to frame digital literacy as lifelong process. Empirical research on this framework has pointed out that such framework helps to recognize the growth and strength of teachers with reflective practices (Gudmundsdottir & Hatlevik, 2018). The UNESCO ICT Competency Framework for Teachers (2018) has mentioned six dimensions for teachers' progress growth and innovation with basic technology usages. This framework beautifully enabling teachers by using learner centered pedagogy to develop higher order thinking ability.

Digital literacy and Teaching practice

Some researchers have stated that classroom practice helps to polish the digital literacy skill among teachers. Teachers who have high level of digital competency they could manage and provide a better learning environment with student engagement with deeper understanding (Tondeur et al., 2018; Voogt et al., 2013). Instead of using technology just as mere substitution they can use it for project based learning along with collaborative problem-solving learning atmosphere (Ertmer & Ottenbreit-Leftwich, 2010). Digital literacy also helps to develop inclusive instruction to enable teachers for providing new dimensions of content delivery and adaptive learning environment. Research has advised that when digital tools used effectively then they help to enhance accessibility including special educational needs (UNESCO, 2018). All these benefits are completely depends on teachers' capability to use technology in the right context. The teachers with digital competency are better to use formative assessment tools liken LMS, online quizzes, and various peer assessment platform for more effective learning instead just merely evaluation (Bond et al., 2020; Hatlevik & Hatlevik, 2018). All these practices are mainly linked with assessment for learning principles which highlights feedback and self-regulations (Darling-Hammond et al., 2017).

Challenges in developing Teachers' Digital literacy

Despite of strong policy and empirical support digital literacy still remain uneven. A meaningful pedagogical integration does not mean the access of digital tools alone (Selwyn, 2016; Tondeur et al., 2017). Rather various interrelated challenges help to develop digital literacy more professional competency. Several teacher education programs continue to

believe that digital literacy just focus on technical skill rather as effective pedagogical practices (Instefjord & Munthe, 2017). These kind of superficial approaches are unable teachers to transfer their knowledge in real life classroom situation. Teachers might learn to use and operate specific tools without even having concept of pedagogical integration. Teachers attitude towards digital literacy play a critical role. Many researchers have shown that teachers are like to prefer traditional teaching method for their own comfort zone (Ertmer et al., 2012; Krumsvik, 2014). Their perception is too narrow regarding digitalization of education system. Their own negative perceptions are playing vital role for their own barriers. Teachers who consider teaching is just delivery of contents in classroom situation they are less likely to adopt digital pedagogies. Conversely those teachers are able to understand the value of collaborative learning along with learner autonomy more likely they are using and considering technology as a meaningful pedagogy (Tondeur et al., 2018).

Both the institutional and systematic factors might become constraint for the development of digital literacy. In addition to this difficulties in curriculum to limited time for various experiments might delay and discourage innovative practices. In other context teacher facing difficulties to deal with digital mediated learning approaches. This process of mismatching between classroom practice and policy has been reflecting in various teacher education researches (Selwyn, 2016). Equity and the issues related access are the most significant concern. Those teachers are working in under developed area are struggling with implementation of digital pedagogies that might lead to frustration.

Digital literacy, Teacher professional identity:

As per recent research trends a close intertwined between digital literacy and professional identity of teachers considered as sense of urgency and requirement. Teaching is never considered as practice but moral and relational profession based on own values and belief system and social recognition as well (Beijaard et al., 2004). Digital technologies not only reshaping educational practices but also influencing teachers own identity about themselves and professional role. It is quite natural to say that the engagement of teachers with digital technology can be challenging and reinforcement for further learning. Some technology might help to provide new opportunities like expanding of pedagogical repertoires that might help to develop professional confidence (Krumsvik, 2014). On the other side external imposed of digital learning might play as new threat or challenging especially when any conflict arise with the belief of teachers' pedagogy (Selwyn, 2016).

Several research have been published in *Teaching and Teacher Education* where teacher consider themselves as main and active decision maker are also adapting with technology positively (Priestley et al., 2015). With this assumption in case of digital literacy making informed pedagogical judgment instead just integrating with policy mandates. Development of professional identity is prominent especially in pre-service teacher education. Various studies indicate that technology-rich pedagogies from early stage are effective for teachers' belief and practice in their respective careers (Tondeur et al., 2017). When digital literacy implanted with effective practice then pre-service teachers can develop coherent professional identity that helps to indicate the integration of technology meaningfully. So the identity oriented viewpoint highlights the significance of dialogic and reflective approaches in teacher

education. Possibility for discussion to collaborative inquiry and critical reflection allow teachers to arrange the meaning of digital literacy within their professional context (Gudmundsdottir & Hatlevik, 2018).

Implications for Pre-service Teacher Education

The findings fused in this study have essential implications for designing the pre-service teacher education plan and program. First of all digital literacy must be include within subject methods course rather just standalone ICT modules. Research shows that ICT integration with authentic pedagogical contexts helps to improve the transfer in classroom practice (Tondeur et al., 2017). Secondly pre-service teaching programs must include reflective practice along with pedagogical reasoning. Instead of just having clarity on the usages of tools, trainee teacher educators should engage students in interpreting why, when and for whom the technology is pedagogically relevant (Ertmer & Ottenbreit-Leftwich, 2010). Micro-teaching experiences along with design projects can help to gain experience to support this form of learning. Thirdly for shaping digital literacy the role and importance of practical experiences are crucial. Research shows that a digitally competent teacher can provide better experience to per-service teachers in their process of learning for further development of confidence and practice (Krumsvik, 2014). Digitally rich environment can easily give a better opportunity for reflection as well as experimentation. Finally another important goal of digital assessment within teacher education can be accomplished successfully. If traditional assessment will remain as the primary source of students' evaluation then engagement with pedagogies might not be effective. Assessment must be the inclusion of collaborative based, enquiry based that support and reinforces the usefulness and worth of digital literacy as professional competency (Hammond et al., 2017).

Implications for In-service Teacher professional development

In the matter of in-service teachers, digital literacy is considered and understood as a continuous process. Any such workshop or tool related ICT training is not sufficient enough for making positive impact on sustained practice (Tondeur et al., 2018). Rather essential professional development must be more effective and should be ongoing which is connected with the context of teachers in classroom situation. Professional learning community approaches helps to allow teachers to share their experience and challenges. School leaders are crucial to shape organization culture that provides immense value in reflective practices. Teachers can be easily engage with innovative practices when time, resources and professional earning will be conjugally directed. Most importantly professional development must ensure about the ethical concerns and various critical dimensions of digital learning. Issues like data privacy and algorithm bias both need informed professional judgment (UNESCO, 2018). For further ethical reflection teacher education programs must embrace critical digital pedagogy.

Policy, implications and future research directions

The analysis is reflected in this study has many implications in educational policy. Now time has come for policymakers to go beyond narrow performance indicators and not to misunderstand that digital literacy is the most complex professional aspects of teachers.

Framework like DigComEdu has given very useful context but need to utilize and adopt. The priority of policy must be the combination of teacher agency and contextual responsiveness. Future study can focus on longitudinal design for understanding the development of digital literacy and career stages. More study can be done related to AI-supported tools in education.

Findings of this study:

1. Digital literacy mainly depends on teacher's attitude, belief and competency including technological and pedagogical integration.
2. Digital literacy plays crucial role if it is implemented from pre-service and it needs reflective practice.
3. Digital literacy become more effective when teachers know when where and how to use technology in in-service teaching.
4. Digital literacy helps to make lifelong progress for teachers and essential for professional development.
5. Institutional barriers might be hindrance for the progress digital learning.

Suggestions and further recommendations:

1. Integration of digital literacy across subject pedagogy courses is important for the preparation of 21st century digitalized classroom.
2. Pre-service teacher education must include technology rich practicum experience.
3. Educational institutions should develop digital infrastructure and must provide technology supportive environment for further implications.
4. Teachers should be encouraging this digital learning progress to become more competent with 21st century digital era.

Conclusion:

This study has mentioned about the importance of digital literacy and it is beyond technical skill. Studies from theoretical framework to various empirical works have shown that digital literacy is the combination of ethical awareness and professional identity and pedagogical judgments. Only skill based approach is not enough for dealing with the complexities of digital teaching-learning process. Instead pedagogical practice, professional collaboration and reflective practice are core part to make digital literacy as an essential teacher competency. For teacher education institutions supportive environment are crucial as integrating digital literacy in professional development.

References

Bawden, D. (2008). Origins and concepts of digital literacy. *Digital literacies: Concepts, policies and practices*, 30, 17–32.

Beijaard, D., Meijer, P. C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education, 20*(2), 107–128.

Bond, M., Zawacki-Richter, O., & Nichols, M. (2020). Revisiting five decades of educational technology research. *Educational Technology Research and Development, 68*(4), 2001–2029.

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change. *Journal of Research on Technology in Education, 42*(3), 255–284.

Ertmer, P. A., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration. *Computers & Education, 59*(2), 423–435.

European Commission. (2018). *DigCompEdu: European framework for the digital competence of educators*.

Gilster, P. (1997). *Digital literacy*. Wiley.

Gudmundsdottir, G. B., & Hatlevik, O. E. (2018). Newly qualified teachers' professional digital competence. *Teaching and Teacher Education, 70*, 241–252.

Hatlevik, I. K. R., & Hatlevik, O. E. (2018). Examining the relationship between teachers' ICT self-efficacy and digital competence. *Computers & Education, 121*, 55–67.

Instefjord, E., & Munthe, E. (2017). Educating digitally competent teachers. *Teaching and Teacher Education, 67*, 37–45.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60–70.

Krumsvik, R. J. (2014). Teacher educators' digital competence. *Scandinavian Journal of Educational Research, 58*(3), 269–280.

Lankshear, C., & Knobel, M. (2011). *New literacies*. Open University Press.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge. *Teachers College Record, 108*(6), 1017–1054.

Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education, 59*(3), 1065–1078.

OECD. (2021). *Teachers and school leaders as valued professionals*.

Priestley, M., Biesta, G., & Robinson, S. (2015). Teacher agency. *Educational Change, 16*(1), 1–20.

Redecker, C. (2017). *European framework for the digital competence of educators*.

Selwyn, N. (2016). *Education and technology: Key issues and debates*. Bloomsbury.

Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy. *Computers & Education, 123*, 1–13.

Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use. *Educational Technology Research and Development, 65*(3), 555–575.

Tondeur, J., et al. (2018). Preparing beginning teachers for technology integration. *Teaching and Teacher Education, 69*, 229–241.

Trust, T., Krutka, S., & Carpenter, J. (2016). "Together we are better". *Computers & Education, 102*, 15–34.

UNESCO. (2018). *ICT competency framework for teachers*.

Voogt, J., Fisser, P., Roblin, N. P., Tondeur, J., & van Braak, J. (2013). Technological pedagogical content knowledge. *Journal of Computer Assisted Learning, 29*(2), 109–121.

Azmi, M. A., Noordin, M. K., Md Nasir, A. N., & Hasnul Hadi, M. H. H. (2024). Assessing the importance of digital literacy as a 21st-century skill among TVET educators. *International Journal of Academic Research in Progressive Education and Development, 13*(4).

Basilotta-Gómez-Pablos, V., Matarranz, M., Casado-Aranda, L. A., & Otto, A. (2022). Teachers' digital competencies in higher education: A systematic literature review. *International Journal of Educational Technology in Higher Education, 19*(8). https://doi.org/10.1186/s41239-021-00312-8

Cabero-Almenara, J., & Palacios-Rodríguez, A. (2020). Assessment of digital teaching competence: Instruments, results and proposals. *Educación XX1, 26*(1). https://doi.org/10.5944/educxx1.33520

Çebi, A., & Reisoğlu, İ. (2022). Tools for assessing teacher digital literacy: A review. *Journal of Computers in Education*. https://doi.org/10.1007/s40692-022-00257-5

Isrokatun, I., Pradita, A. A., Ummah, S. A., Amalia, D. Y., & Salsabila, N. S. (2022). Digital literacy competency of primary school teacher education department students. *Mimbar Sekolah Dasar, 9*(3).

König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure. *European Journal of Teacher Education, 43*(4), 608–622.

Li, H., & Chen, Y. (2025). A visual analysis of research literature on teachers' digital literacy. *Frontiers in Education*. https://doi.org/10.3389/feduc.2025.1597121

Rakisheva, A., & Witt, A. (2023). Digital competence frameworks in teacher education: A literature review. *Issues and Trends in Learning Technologies, 11*(1). https://doi.org/10.2458/itlt.5205

Starkey, L. (2020). From digital literacy to digital competence: The teacher digital competency framework. *Educational Technology Research and Development*. https://doi.org/10.1007/s11423-020-09767-4

Tabieh, A. A. S., Hamzeh, M., Abu-Foudeh, B. K., Jarrar, N., Al-Manaseer, S., Al-Shawabkeh, A., & Seikaly, R. (2021). Digital literacy and its acquisition by teachers

and principals. *International Journal of Learning, Teaching and Educational Research, 20*(5). https://doi.org/10.26803/ijlter.20.5.3

Zhang, L., Yang, C., & Zheng, Y. (2025). Digital competence for sustainable education of pre-service teachers. *Frontiers in Psychology, 16*. https://doi.org/10.3389/fpsyg.2025.1710983

Zhang, X., Sazalli, N. A. H., & Miskam, N. N. (2024). Improving teachers' digital competence in higher education. *International Journal of Academic Research in Progressive Education and Development, 13*(1), 967–979.