e-ISSN: 2600-7568

Available online at
https://gadingssuitm.com/index.php/gadingss

GADING Journal for the Social Sciences 29(1) 2026, 151 – 163

GADING Journal for the Social Sciences

Assessing Digital Readiness and Self-Concept in Rural Classrooms: A Systematic Literature Review of ICT in Teaching and Learning

Sharifah Sara Hasliza Syed Hamid[1*], Rosilawati Sueb[2]

[1,2] *Faculty of Education, Universiti Teknologi MARA Cawangan Selangor, Kampus Puncak Alam, 42300, Selangor, Malaysia*

ARTICLE INFO

Article history:
Received 17 November 2025
Revised 30 December 2025
Accepted 11 January 2026
Online first
Published 28 February 2026

Keywords:
digital readiness
ICT integration
rural education
students' self-concept
teacher digital competence

DOI:
https://doi.org/10.24191/gading.v29i1.749

ABSTRACT

A systematic literature analysis was carried out to examine how Information and Communication Technologies (ICT) are integrated into rural classrooms and how teachers' digital readiness relates to students' digital self-concept. The studies included in this review were conducted in rural regions across various countries, encompassing areas with limited access to educational resources and technological infrastructure. The results have shown that rural education is stifled by insufficient access to technological resources, poor infrastructure, and a lack of teacher training, all of which impede the effective implementation of ICT. The review highlights that in to successfully integrate ICT the teachers' digital skills are of great importance. But rural teachers lack the digital skills and institutional support is a hindrance for them to use technology effectively in teaching. Furthermore, the confidence and capabilities of the school's students and their digital tool implementation are heavily influenced by the digital readiness of their teachers. Such reliance frequently reduces a student's self-concept in the digital space in resource-poor settings. This discussion highlights the importance of introducing specialised professional development programs for teachers, mobilising more technical support, and proactively cultivating students' confidence in the digital environment. These steps are essential to address the digital divide and make rural education more equitable.

1. INTRODUCTION

Educational digital transformation, especially in rural settings, can help make educational enhancement significantly more effective, as access to traditional educational resources is limited in rural areas, the digital transformation has the power to bring benefit to learning. Yet these potentials are constrained by weak infrastructure, poor internet connectivity, limited technology knowledge, and a lack of teachers' digital competence, which constrain proper ICT use in the context of education. As a result, teachers' digital competence is one of the main factors that would assist in surmounting these barriers, affecting their use of ICT, and students' engagement with digital tools. This review seeks to investigate the relationship between

[1*] Corresponding author. Sharifah Sara Hasliza Syed Hamid *E-mail address*: dr.sarahasliza@gmail.com

rural teachers' digital readiness and students' digital self-concept and provides ways to encourage digital inclusion in rural education for example through targeted professional development and resource allocation.

1.1 Research Objectives

Research objectives of this study are:

i. To examine the influence of the rural teachers' digital readiness on ICT integration.
ii. To analyse the relationship between students' self-concept and usage of digital tools.
iii. To make recommendations on strategies to support rural teachers and students in integrating digital education effectively.

1.2 Research Questions

This literature review is a systematic investigation into teachers, as far as their influence on the self-concept of the students in the rural primary/secondary schooling is concerned, in terms of digital competence. It examines the level of readiness of teachers to incorporate information and communication technologies (ICT) into pedagogy and the level of student confidence and engagement, identified through the prism of marginalised rural settings. The review emphasises the need to develop teacher professional growth and the nurturing of digital skills to improve student outcomes in poor rural settings.

i. How does rural teachers' digital readiness affect ICT integration?
ii. What is the relationship between students' self-concept and digital tools usage?
iii. Which strategies can be recommended to assist the rural teachers and students in integrating digital education effectively?

1.3 Conceptual Clarification

Several key concepts in this review require clarification to ensure conceptual transparency. Rural classrooms refer to primary and secondary educational settings located in geographically remote or semi-remote areas, often characterised by limited infrastructure, restricted access to digital technologies, inadequate internet connectivity, and reduced institutional support compared to urban schools (Samane-Cutipa et al., 2022; H. Wang & Zhang, 2024). These classrooms frequently serve students from low socio-economic backgrounds and are disproportionately affected by the digital divide, which influences both teaching practices and student learning opportunities (Soriano-Alcantara et al., 2024).

Teachers' digital readiness refers to teachers' readiness to successfully embed Information and Communication Technologies (ICT) into teaching and learning processes. This readiness includes more than technical skills, such as pedagogical competence, confidence, attitudes toward technology, and access to sustained professional development (Guillén-Gámez & Mayorga-Fernández, 2022a; Revuelta-Domínguez et al., 2022). In rural contexts, limited training opportunities and institutional support often constrain teachers' digital readiness, directly affecting classroom ICT practices.

Students' digital self-concept is defined as students' perceptions of their own abilities, confidence, and competence in using digital tools for learning (Vergili & Kara, 2024). In rural educational settings, the digital self-concept of students is strongly influenced by teachers' digital practices, school-level ICT culture, and access to digital resources, such that minimal contact with technology is associated with decreased digital confidence and engagement (Wargo & Simmons, 2021).

Finally, integration of ICT in rural classrooms may be understood as meaningful and pedagogically appropriate use of digital tools rather than just technology vffor teaching, learning, communication, and assessment (Kim et al., 2022; Wang, Tigelaar, et al., 2021). This review embraces these definitions to systematically discuss how teachers' digital readiness affects ICT integration and subsequently shapes students' digital self-concept in rural educational settings.

https://doi.org/10.24191/gading.v29i1.749

2. LITERATURE REVIEW

The integration of Information and Communication Technologies (ICT) in education has been widely studied, particularly in rural settings, where access to technology is often limited. Although many publications focus on digital skills and ICT usage, the significant focus of this review is the contribution of ICT to the formation of students' digital self-concept. Students' digital self-concept is about how they believe that they can use digital tools, which is reflected not only by their own proficiency, but also teacher competence and confidence.

2.1 Teachers' Digital Competence and its Impact on Students' Self-Concept

Educators' digital competence is one of the major variables that affects the integration of ICT. Studies of rural teachers' digital competence found these teachers to be only intermediate. This limited ability to take ICT from mere surface level to full integration into teaching was noted in one study. Guillén-Gámez Mayorga-Fernández (2022) say for example that even in Spain many rural teachers have intermediate skills in developing digital material and facilitating collaborative online activities. Faced with these difficulties in competence, it is also found that teachers were less able to provide effective learning experiences that foster students' digital self-concept, which in turn made the provision of learning experiences particularly difficult for students. Likewise, Hurtado-Mazeyra et al. (2022) revealed that many Peruvian teachers work at an integrator level of digital competency that inhibits them from creating high-quality digital content or using digital tools effectively for teaching.

Studies have demonstrated that teachers' digital competence is an important aspect of students' digital self-concept. When teachers are digitally capable and confident, students tend to build the confidence to use digital tools themselves. Castaño Muñoz et al. (2023) found that school-wide ICT initiatives are influential in improving students' digital skills, and hence a school-wide ICT culture can positively affect students' self-concept. Similarly, Chiu et al. (2024) highlight that school-level policies that promote self-determination theory rooted in enhancing teachers' digital competence are also positive predictors of students' digital involvement. Such studies showcase the need not only to develop teachers' digital skills, but also fostering a positive digital identity for students. The culture in schools towards digital tools is strongly associated with the students' confidence and skills in making use of ICT.

2.2 Barriers to ICT Integration in Rural Contexts

While ICT can enhance and augment education, many problems hamper rural schools from successfully implementing a sound integration of ICT. Those barriers range from poor infrastructure, low access to the internet, and lack of teacher preparation. The COVID-19 pandemic laid bare and further exacerbated these challenges. For example, in Kerala's secondary schools, the supply of ICT tools was limited due to inadequate infrastructure and insufficient teacher training, limiting students' engagement and hindering the development of digital skills (Anil & Jayakumar, 2020). Likewise, Mollo (2022) claims pre-service teachers in South Africa believed in the power of ICT, yet did not feel equipped to deliver quality work out of ICT due to lack of training. Teachers' unpreparedness reduces students' use of such technology, and students' digital identities, as they are less likely to learn to confidently operate with technology that is not the teacher's job to deliver with the aid of it.

These results echo a widespread challenge among many rural communities: the phenomenon of the digital divide, which not only impacts the accessibility of technology, but also the quality of digital education. Tarigan et al. (2022) acknowledge the importance of a collaborative strategy between governments, educators, and communities, to address the digital divide and to enable all students, regardless of their location, access to digital technology, including internet tools and training. When teachers are given professional development opportunities, students also receive them because they can better manage the learning environment where they can learn to develop their digital self-concept.

https://doi.org/10.24191/gading.v29i1.749

So, while most studies focus on digital skills and ICT use, it is necessary to look into other domains to understand what impact these factors have on students' digital selves. These studies highlighted here suggest that ICT inclusion in rural education is much more than the supply of technology: it is related to the education of teachers, and school-wide efforts to foster an environment that is positive and affording with regard to the digital spaces through which pupils will learn. This article argues that teachers' digital readiness, facilitated by professional development, supported by a supportive digital culture within schools, is central to shaping a positive digital self-concept in students.

3. METHODOLOGY

This SLR followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines for both strictness and transparency in synthesis. PRISMA in this intervention was integral to a systematic decomposition and analysis of elements impacting teachers' readiness and students' engagement in rural schools confronted with a dearth of digital resources. The PRISMA guidelines are required whenever systematic integration of empirical research is undertaken as the methodological rigour and transparency are crucial. PRISMA should be applied to enhance credibility, reproducibility, and unbiased synthesis for the literature review, particularly when examining complex problems such as teachers' digital readiness and students' self-concept in rural teaching situations (Alzakwani et al., 2025; Revuelta-Domínguez et al., 2022). Moreover, Samane-Cutipa et al. (2022) stresses the need to apply PRISMA when judging the quality of research, including some on digital inequality in rural education. The systematic search strategy used for the main academic databases such as Scopus and Web of Science was employed to identify relevant publications between 2015 and 2024.

Rural education settings were identified for the present review according to authors' explicit designation of study areas as rural or remote and contextual descriptors indicating limited infrastructure, restricted digital access, or marginalised educational environments. This allowed for consistent selection of studies and ensured consistency with the review's focus on rural educational contexts.

3.1 Identification Phase

The identification stage in the systematic literature review process was applied according to the PRISMA requirements so as to achieve transparency and reproducibility of the methodology. Almasri et al. (2021) indicate that this plan should be established to enhance credibility, reduce bias, and provide a structured and systematic search engine. This step is a critical one when working on a complex subject as digital competence in rural education, which Revuelt Revuelta-Domínguez et al. (2022) state PRISMA is useful for synthesising studies and the validity and transparency of the findings of all research. Additionally, making research selection in such way assisted the rigour and credibility of this research process to the best extent in limiting search to relevant and academically sound studies.

3.2 Screening Phase

For inclusion, the full-text review of the study in the initial stage ensured only the most relevant and high-quality investigations were included as part of eligibility. Studies were systematically screened against the previously defined inclusion and exclusion criteria, to assess their appropriateness to the aims of the research. Studies included were required to employ empirical methods, be peer-reviewed, and focus on topics relating to both teachers' digital competence and students' self-concept within the context of rural education.

Table 1 lists the keywords used in the systematic searches conducted on the Scopus and Web of Science databases. These keywords were carefully selected to ensure a comprehensive search strategy, covering studies on teachers' digital competence, ICT integration, and student outcomes within rural education settings.

https://doi.org/10.24191/gading.v29i1.749

Table 1. Keywords used in Systematic Searches

Database	Keyword	Identification	Inclusion
Scopus	Teacher digital competency	127	2
Scopus	ICT integration in education	52	1
Scopus	Rural education technology	69	2
Web of Science	Teacher digital competence	89	4
Web of Science	ICT access in rural schools	163	4
Left alignment	Student self-concept in digital learning	80	0

Table 2 summarises the inclusion and exclusion criteria applied during the eligibility phase, which specified the type of literature, language, publication timeframe, educational level, and geographic focus for study selection. These criteria ensured the systematic inclusion of relevant, peer-reviewed empirical studies while excluding research outside the scope of the research questions.

Table 2. Eligibility and Exclusion Table

Criterion	Eligibility	Exclusion
Types of literature	Peer-reviewed research articles	Conferences, books, theses, dissertations, reports, and documentaries
Language of choice	English language	Languages other than English
Time range	Published between 2015 and 2024	Published before 2015
Education level	Primary and secondary education in rural settings	Preschool education, secondary and higher education, adult education
Country	Global (with a focus in rural educational contexts)	Studies not related to rural education

Figure 1 shows the process of finding relevant studies by adhering to the PRISMA guidelines. Based on the findings, there are thirteen studies that were included in this review.

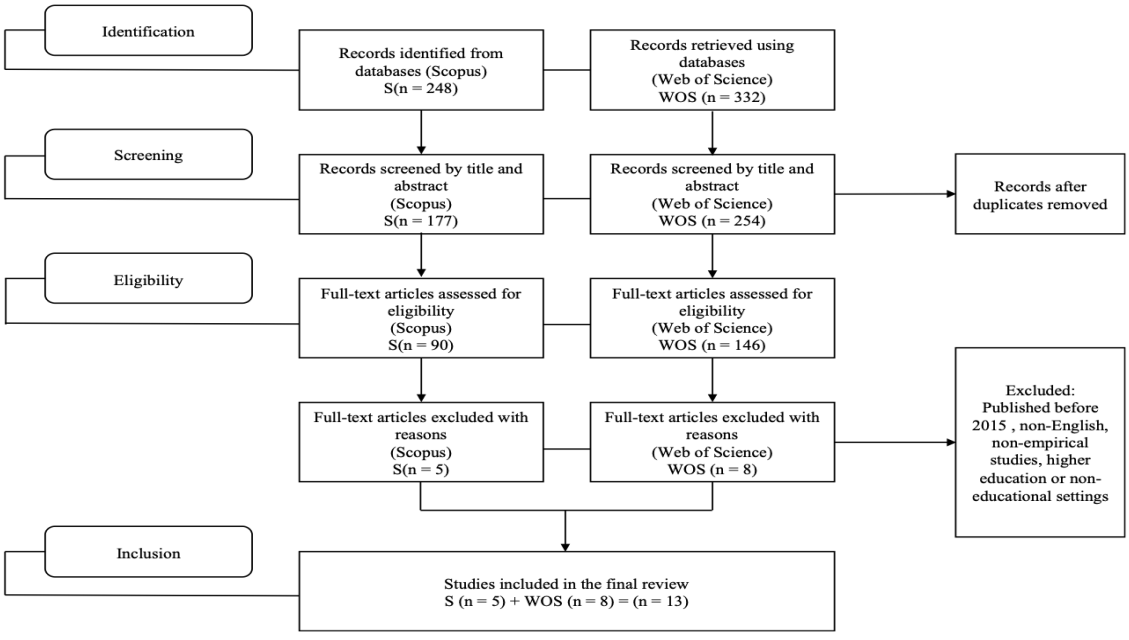

Fig. 1. PRISMA Flow Chart

https://doi.org/10.24191/gading.v29i1.749

4. DATA EXTRACTION AND ANALYSIS

Table 3. Data Extraction and Analysis

S/N	Author(s) and Year	Country	Focus Area	Method	Key Finding	Relevance to Rural Education
1.	Álvarez and Inés-García (2017)	Spain	School Website Management	Qualitative	The management of school websites is often inconsistent, typically overseen by ICT coordinators. Updates are infrequent, with responsibilities concentrated among a small number of individuals.	The findings reflected the challenges in rural and semi-rural schools, where limited resources and a shortage of trained staff hinder the effective management and maintenance of school websites.
2.	Armah et al. (2024)	Ghana	ICT Education with Indigenous Knowledge	Quantitative	The Culturo-Techno-Contextual Approach (CTCA) enhanced students' understanding of ICT even without digital tools and contributed to narrowing the gender gap in ICT learning.	CTCA is an efficient approach for rural ICT teaching as it is based on indigenous knowledge, thus applicable to low-resource settings.
3.	Barbuta et al. (2024)	Moldova	Digital proficiency in rural education	Quantitative	This study identified several digital skills gaps among rural Moldovan middle school students, namely content creation and problem-solving skills. The research similarly pointed to the importance of direct, in-person teacher-student interaction in gaining these skills.	The research also identified the digital divide between rural areas and urban areas, recommending improved infrastructure, enhanced teacher training, and specific contextual support to improve digital competence in rural schools.
4.	Bianchi et al. (2022)	China	Computer-Assisted Learning (CAL)	Quantitative	The participation of the CAL program dramatically improved students' academic achievement, work preparedness, as well as computer skills, with effects lasting up to a decade.	CAL bridges the rural-urban learning divide by leveraging satellite-based systems to deliver education, providing essential aid in rural areas where educational resources are minimal.
5.	Guillén-Gámez and Mayorga-Fernández (2022)	Spain	Rural Teachers' Digital Competence	Quantitative	Rural teachers generally embraced digital tools; however, their competence varied significantly by	This study offered essential data on the digital challenges faced by teachers in rural parts of Spain. Gender-based gaps

					gender and school type, the study found. Self-assessment surveys identified platforms such as blogs, TikTok, and Moodle as key indicators of digital engagement.	and the need for targeted training programs in rural education to address the digital divide, a central concern of this review, are also emphasised in the study.
6.	Kim et al. (2022)	South Korea	Maker Education, ICT Integration	Mixed-methods	The study proposed the NE-Maker instructional model for rural schools. This model incorporates engineering principles, maker-based learning, and design thinking with affordable tools. The model also emphasises collaboration and hands-on problem-solving.	The study proposed the NE-Maker instructional model for rural schools. This model incorporates engineering principles, maker-based learning, and design thinking with affordable tools. The model also emphasises collaboration and hands-on problem-solving.
7.	Parvin (2017)	Bangladesh	Virtual Interactive Teacher Training	Quantitative	It was noted in the study that virtual interactive training for rural English teachers in Bangladesh is not available due to distance, lack of funding, poor infrastructure, and other obstacles.	It was noted in the study that virtual interactive training for rural English teachers in Bangladesh is not available due to distance, lack of funding, poor infrastructure, and other obstacles.
8.	Soriano-Alcantara et al. (2024)	Dominican Republic	Digital Competencies in Education	Mixed-methods	The study revealed considerable digital skill gaps between rural and urban areas in the Dominican Republic and are explained by gender, geographical location, and unequal access to digital resources.	The study revealed considerable digital skill gaps between rural and urban areas in the Dominican Republic and are explained by gender, geographical location, and unequal access to digital resources.
9.	Vergili and Kara (2024)	Turkey	New Media Literacy (NML) in K-12 Students and Teachers	Quantitative	Educators showed significantly higher levels of New Media Literacy (NML) than students, with male students outperforming females in presuming literacy. Similarly, teachers' subject field (ICT) affects NML.	Educators showed significantly higher levels of New Media Literacy (NML) than students, with male students outperforming females in presuming literacy. Similarly, teachers' subject field (ICT) affects NML.

10.	Wargo and Simmons (2021)	USA	Rural Education and Technology Integration	Qualitative	According to the research, teachers have stronger NML capacity than students; the male students outperforming females in presuming literacy. The level of NML among teachers was also significantly affected by their ICT expertise.	According to the research, teachers have stronger NML capacity than students; the male students outperforming females in presuming literacy. The level of NML among teachers was also significantly affected by their ICT expertise.
11.	Wang et al. (2021)	China	Teacher digital competence and student learning outcomes	Mixed-methods	Flexible methods of teaching supplemented with the development of digital capabilities resulted in a significant increase in student engagement and academic performance, the research found.	Flexible methods of teaching supplemented with the development of digital capabilities resulted in a significant increase in student engagement and academic performance, the research found.
12.	Li et al.,2024)	China	Teacher Digital Competence and ICT Use	Quantitative	A study in this category had established that urban teachers had higher digital skills than their rural colleagues and found a positive relationship between their digital competence, digital tools, and computational thinking skills.	A study in this category had established that urban teachers had higher digital skills than their rural colleagues and found a positive relationship between their digital competence, digital tools, and computational thinking skills.
13.	(J. Wang et al., 2022)	China	ICT Integration in Rural Education	Mixed-methods	Weak policy implementation, inadequate infrastructure, and insufficient teacher training were the main barriers to ICT integration in rural schools, as identified in the study. The study emphasised the need for aligned local policies, enhanced digital content, and improved professional development.	Weak policy implementation, inadequate infrastructure, and insufficient teacher training were the main barriers to ICT integration in rural schools, as identified in the study. The study emphasised the need for aligned local policies, enhanced digital content, and improved professional development.

https://doi.org/10.24191/gading.v29i1.749

4.1 Descriptive Analysis of Methodology

4.1.1 Analysis of Methodology

In Figure 2 the distribution of research methodologies is explained. Methods are mainly reported in the quantitative section (54%), concentrating on statistical analysis and empirical data. 31% use mixed-method designs that adopt two perspectives that allow researchers to develop a more comprehensive understanding of the topics considered in the research. The other 15% have employed qualitative approaches, resulting in rich, contextualised insights into the issues under investigation. This illustrates the predominantly empirical, evidence-based research emphasis on research exploring teachers' digital competence and student outcomes mainly in rural education contexts.

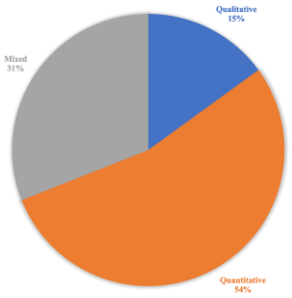

Fig. 2. Analysis of Methodology

4.1.2 Annual Publication

Figure 3 shows the annual distribution of studies included in this review. Such research is on an upsurge for teacher digital competence and student outcomes in rural education. In 2024, the volume was five studies which reflects an increasing academic interest in this subject area. Fewer publications were published in earlier years; previous years, such as 2017, demonstrate that digital tools in rural education has only recently emerged as a topical focus of scholarly inquiry.

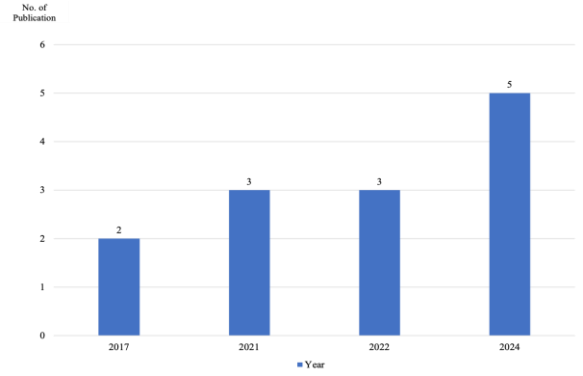

Fig. 3. Annual Publication

4.1.3 Research Country Affiliation

The study geography displayed in this review is shown in Figure 4. Of the studies included, a large proportion (31%) comes from China, which showed a great emphasis on digital competence and rural education. Spain was at 15%, followed by South Korea, Bangladesh, the Dominican Republic, Turkey and the United States, which accounted for 8% each. Both Ghana and Moldova represented 7% each. This

https://doi.org/10.24191/gading.v29i1.749

distribution demonstrates the global focus on rural digital education, especially in countries facing a range of infrastructural and educational challenges.

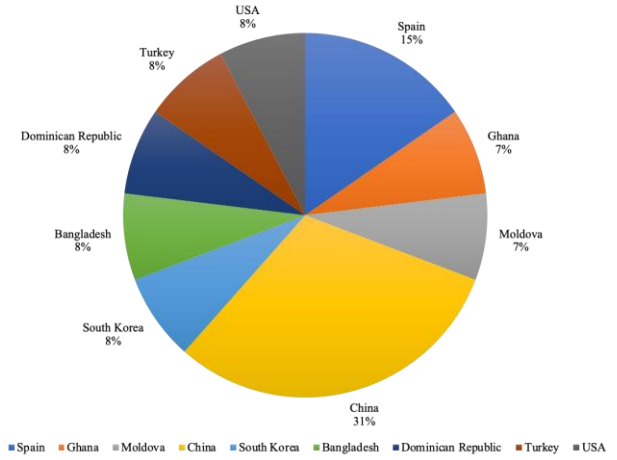

Fig. 4. Research Country Affiliation

5. FINDING & DISCUSSION

Based on this analysis, several crucial observations regarding the relationship between teachers' digital preparedness, ICT integration, and students' digital self-concept can still be made, especially in underprivileged rural areas.

5.1 Rural Teachers' Readiness Impact on ICT Integration

As a result, rural teachers are more likely to use technology as part of their pedagogical practices, increasing student engagement and teaching, which in turn benefits the student. Despite high demand amongst rural educators, urban ones have greater digital capability and thus, face substantial challenges when they wish to utilise ICT for rural students' digital self-concept (Li et al., 2024). Moreover, the lack of digital competence of rural teachers is accentuated further by the lack of government support in adopting technology in teaching and learning in rural environments. Wang et al. (2022) emphasise that rural teachers often encounter insufficient professional development opportunities and inadequate facilities, as well as key resources such as stable online access to information and updated electronic content)in rural areas as compared to cities. The solution to all these issues is to put the emphasis on targeted training schemes and most importantly, on constructing infrastructure, which is essential if this environment is conducive for ICT in learning.

5.2 Students' Self-Concept and Engagement with Digital Tools

With limited technology accessible in a rural location, the need for digital tools to be integrated into the classroom is important for building students' digital self-concept. If such students are from low-socioeconomic backgrounds, they need a fair opportunity to access digital technologies, and schools should be the primary place that helps them get technology access. Students will be more likely to acquire a sense of competence and confidence in the use of technology in learning if teachers have the capability to incorporate ICT in teaching practice. This was evidenced by Guillén-Gámez and Mayorga-Fernández (2022) who found that even with limited digital skills, rural teachers who provided a supportive digital environment increased students' confidence in and involvement in the learning process. Nevertheless, inadequate digital training provided to rural teachers and inadequate ICT access in many rural regions generally caused the children to have a negative self-concept, feeling like they were not fit enough,

disconnected that affected their development of academic accomplishment. Wargo and Simmons (2021) support this, highlighting that among students from rural areas, low digital self-esteem is a problem, largely because of the fact that availability of ICT was irregular especially in educational institutions among them. These studies emphasised that the empowerment of rural students for the use of ICT in their learning needs systematic intervention that enhances access to digital tools and provides sustained support to rural educators.

5.3 Strategies to Support Teachers and Students in Rural Regions

While integrating ICT in rural schools, two essential actions are required including training teachers for such digital skills and ensuring students have equal access to digital technologies. Kim et al. (2022) claimed that a lot of training programmes do not take seriously the special challenges for teachers in rural areas, such as the problem of limited availability of internet and resources. Furthermore, the digital competence of teachers could be substantially better developed through localised and practical ICT training and the establishment of collaborative networks of knowledge sharing. The findings of Tarigan et al. (2022) support this finding that the collaboration of governments, teachers, and society is a prerequisite and necessary condition to ensure a rural school's adaptation of the digital education system. With students, a solution is necessary to address the digital divide, in that it should include a curriculum of digital literacy at rural schools and in making accessible inexpensive gadgets such as a permanent internet connection. Digital self-esteem is an issue that should be positively nurtured for increased student engagement and for a better self-perception (Parvin, 2017).

6. CONCLUSION

As evidenced by the systematic literature review, the implementation of ICTs in rural schools relies on the digital readiness of educators. Teachers' digital competence affects how effectively technology is integrated into teaching and learning. Indeed, there is still a need for professional development for rural educators in areas with less infrastructure and greater digital illiteracy than their urban colleagues. This review draws attention to the influence of students' digital self-concept and suggests that positive application of technology can contribute positively to students' levels of self-confidence and feelings of competence. In this situation, a sustainable response to these challenges calls for investment in teacher development, hardware and infrastructure, and equity in the provision of digital resources among students. Bridging these gaps is urgently needed to close the digital divide for students in their learning environment and promote a fairer and more inclusive digital learning environment. Moreover, the conclusion shows that over 30 percent of those reports looked at used AI tools in their approach, indicating an increasing trend of employing AI for improving educational results.

ACKNOWLEDGEMENTS/FUNDING

The authors thank Universiti Teknologi MARA (UiTM) Puncak Alam for their assistance in this manuscript. We also thank the reviewers for their thoughtful comments and helpful feedback contributing to enhancing the clarity and depth of this review on the integration of Information and Communication Technology in rural learning institutions. No external financing was provided to this research. All aspects of this study were performed by the author.

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest.

AUTHORS' CONTRIBUTIONS

This includes creating the research concept, construction of the study framework, and conducting the systematic literature review. The author was responsible for data collection, data analysis, and interpretation, ensuring that the review complied with PRISMA guidelines for transparency and rigor.

Furthermore, the author wrote, revised, and finalised the manuscript, integrating relevant scholarly insights and ensuring alignment with academic standards. The author has also fully developed, edited, and finished the whole work done from the conception and originality of her research through paper revisions and editing.

REFERENCES

Almasri, H., Zakuan, N., Amer, M. S., & Majid, M. R. (2021). A developed systematic literature review procedure with application in the field of digital transformation. *Estudios de Economia Aplicada*, *39*(4). https://doi.org/10.25115/eea.v39i4.4559

Álvarez, C. Á., & Inés-García, J. (2017). The management of schools' websites in Cantabria, Spain. *Research in Learning Technology*, *25*(1). https://doi.org/10.1080/21567069.2017.1270579

Alzakwani, M. H. H., Zabriv, S. M., & Ali, R. R. (2025). Training of ICT for educational performance: A systematic review. *International Journal of Innovative Research and Scientific Studies*, *8*(1), 2009–2020. https://doi.org/10.53894/ijirss.v8i1.4873

Amemasor, S. K., Oppong, S. O., Ghansah, B., Benuwa, B. B., & Essel, D. D. (2025). A systematic review on the impact of teacher professional development on digital instructional integration and teaching practices. In *Frontiers in Education* (Vol. 10). Frontiers Media SA. https://doi.org/10.3389/feduc.2025.1541031

Anil, A., & Jayakumar, M. S. (2020). ICT integration in education: The case of secondary schools in Kerala. *PEOPLE: International Journal of Social Sciences*, *4*(3), 1948–1962. https://doi.org/10.20319/pijss.2019.43.19481962

Armah, M., Tetteh, A., & Nkrumah, F. (2024). Teaching ICT to pre-schoolers in the global south using indigenous knowledge patterns. *Journal of Applied Research in Higher Education*. https://doi.org/10.1108/JARHE-06-2024-0261

Barbuta, A., Ghetau, C., & Iovu, M.-B. (2024). Evaluating digital proficiency: A study on online and face-to-face educational engagement among rural middle school students in Republic of Moldova. *Revista Romaneasca Pentru Educatie Multidimensionala*, *16*(2), 24–44. https://doi.org/10.18662/rrem/16.2/844

Bianchi, N., Lu, Y., & Song, H. (2022). The effect of computer-assisted learning on students' long-term development. *Journal of Development Economics*, *158*. https://doi.org/10.1016/j.jdeveco.2022.102919

Demirtaş, B., & Mumcu, F. (2021). Pre-service teachers' perceptions of ICT and TPACK competencies. *Acta Educationis Generalis*, *11*(2), 60–82. https://doi.org/10.2478/atd-2021-0013

Erikson Tarigan, K., Elahi, E., & Stevani, M. (2022). *Journal of Learning and Development Studies Education Responses in Teaching during Covid-19: The Ongoing Result in Online Learning Implementations*. https://doi.org/10.32996/jlds

Guillén-Gámez, F. D., & Mayorga-Fernández, M. J. (2022). Measuring rural teachers' digital competence to communicate with the educational community. *Journal of New Approaches in Educational Research*, *11*(2), 323–341. https://doi.org/10.7821/naer.2022.7.1053

Hurtado-Mazeyra, A., Núñez-Pacheco, R., Barreda-Parra, A., Guillén-Chávez, E. P., & Turpo-Gebera, O. (2022). Digital competencies of Peruvian teachers in basic education. *Frontiers in Education*, *7*. https://doi.org/10.3389/feduc.2022.1058653

Kim, J. Y., Seo, J. S., & Kim, K. (2022). Development of novel-engineering-based maker education instructional model. *Education and Information Technologies*, *27*(5), 7327–7371. https://doi.org/10.1007/s10639-021-10841-4

Li, W., Chen, A., Zhang, J., & Fu, W. (2024). Factor structure and psychometric properties of the digital competence of educators among Chinese primary and secondary school teachers. *Current Psychology*, *43*(24), 21338–21353. https://doi.org/10.1007/s12144-024-05865-1

Mollo, P. P. (2022). *An analysis of student teachers' e-readiness for digital education environment in COVID-19 Times*. 8–12. https://doi.org/10.36315/2022v2end002

Mosquera-Gende, I. (2024). Digital Competence of Future English Language Teachers: Influence of Age and Gender on Their Self-perception. *Forum for Linguistic Studies*, *6*(3), 357–373. https://doi.org/10.30564/fls.v6i3.6613

Parvin, I. (2017). A conceptual framework of virtual interactive teacher training through open and distance learning for the remote areas' English teachers of Bangladesh. *Turkish Online Journal of Distance Education, 1*.

Revuelta-Domínguez, F. I., Guerra-Antequera, J., González-Pérez, A., Pedrera-Rodríguez, M. I., & González-Fernández, A. (2022). Digital teaching competence: A systematic review. *Sustainability (Switzerland), 14*(11). https://doi.org/10.3390/su14116428

Samane-Cutipa, V. A., Quispe-Quispe, A. M., Talavera-Mendoza, F., & Limaymanta, C. H. (2022). Digital gaps influencing the online learning of rural students in secondary education: A systematic review. *International Journal of Information and Education Technology*, *12*(7), 685–690. https://doi.org/10.18178/ijiet.2022.12.7.1671

Soriano-Alcantara, J. M., Guillén-Gámez, F. D., & Ruiz-Palmero, J. (2024). Exploring the educational digital landscape in the Dominican Republic: a comparative study of competencies in different stages and socio-digital environments. *Journal of Computers in Education*. https://doi.org/10.1007/s40692-024-00331-0

Vergili, M., & Kara, M. (2024). An investigation of students and teachers' new media literacy: the contributing characteristics with the moderator role of gender. *Technology Enhanced Learning*, *19*, 29. http://creativecommons.org/licenses/by/4.0/.

Wang, J., Tigelaar, D. E., & Admiral, W. (2022). From policy to practice: Integrating ICT in Chinese rural schools. *Technology Pedagogy and Education*, *31*(4).

Wang, J., Yang, Y., Li, H., & van Aalst, J. (2021). Continuing to teach in a time of crisis: The Chinese rural educational system's response and student satisfaction and social and cognitive presence. *British Journal of Educational Technology*, *52*(4), 1494–1512. https://doi.org/10.1111/bjet.13129

Wargo, E. S., & Simmons, J. (2021). Technology storylines: A narrative analysis of the rural education research. *The Rural Educator, 42*(2), 35–50. https://doi.org/10.35608/RURALED.V42I2.1240

Yermekova, M., Yrymbayeva, N., Rakhimgalieva, P., & Akbidash, A. (2025). Bridging the digital divide: Assessing future educators' competence in Kazakhstan's higher education through the DigCompEdu framework. *International Journal of Innovative Research and Scientific Studies*, *8*(1), 1224–1238. https://doi.org/10.53894/ijirss.v8i1.4572

About the Authors

Sharifah Sara Hasliza Syed Hamid, is a PhD student in the Department of Education at Universiti Teknologi MARA (UiTM) Puncak Alam. Her main research activity focuses on digital competency and self-concept in education. Her doctoral work explores the relationship between teachers' digital skills and students' academic self-perception in technology-enhanced learning environments. She can be reached via email at dr.sarahasliza@gmail.com

Rosilawati binti Sueb, PhD is a Senior Lecturer in the Department of Educational Studies, Faculty ofEducation at Universiti Teknologi MARA (UiTM). Her areas of expertise include Educational Psychologyand Classroom Management. She has contributed to various research projects and publications that focuson learner development, instructional strategies, and effective classroom practices. She can be reached viaemail at rosil334@uitm.edu.my