INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 13, Issue 3, (2024) E-ISSN: 2226-6348

The Challenges of Digitization of Education Among Primary School Teachers: Through Systematic Literature Review

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To Link this Article: http://dx.doi.org/10.6007/IJARPED/v13-i3/22144 DOI:10.6007/IJARPED/v13-i3/22144

Published Online: 06 August 2024

Abstract

This study aims to conduct a systematic literature review using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology. A systematic literature review involves the analysis of recent studies that have been carried out in this field. This approach involves an in-depth review of relevant previous studies to collect data to identify challenges in the expansion of digitalization of education among primary school teachers. This challenge becomes the main focus because of the important role of teachers in integrating technology in the teaching and learning process. Based on the results of the analysis, several key challenges have been identified, including limited technological infrastructure, professional training and development, and technical support. In addition, lack of technology skills, inability or uncertainty of teachers in using technology and lack of support and leadership were also found to hinder this digitization process. The results of this study provide important guidance for the development of training programs and more effective support strategies to improve the integration of technology in primary school education. The implication of this study is to help education policy makers formulate policies that support a comprehensive and effective educational digitization effort.

Keywords: Education Challenges, Education Digitization, Systematic Literature Review, PRISMA, Education Policy.

Introduction

The rapid development of digital technology has brought great changes in various sectors, including the education sector. The Digital Education Policy (DPD) is a statement of commitment by the Malaysian Ministry of Education (KPM) launched on 28 November 2023 (Ministry of Education, 2023). Digital education involves learning about knowledge, skills, and values related to digital technology, as well as the application of digital technology in an integrated, creative, and innovative manner in the teaching and learning process (PdP) to produce a generation that is skilled in the digital field. Digitization of education refers to the use of digital technology to support and improve the teaching and learning process. At the primary school level, the digitization of education has the potential to change the way

teachers teach and the way students learn, making learning more interactive, interesting, and effective.

However, the implementation of education digitization is not without challenges. Teachers, as the main agents in the implementation of digital education, often face various obstacles that can affect the effectiveness of using technology in the classroom. These challenges can come in many forms, including a lack of technology skills, inadequate infrastructure, and limited support and training (Haslin & Hamzah, 2023).

Although many studies have been conducted on the digitization of education, most of those researches focus more on the secondary and higher education levels, leaving a significant gap in the context of primary schools. In addition, previous studies tend to focus on technical aspects and infrastructure, but give less emphasis to human factors such as attitude, acceptance, and teacher training. Existing research also does not comprehensively analyze the impact of technical support and leadership on the effectiveness of digitization. Therefore, there is an urgent need to study the specific challenges faced by primary school teachers in integrating technology in teaching and learning.

The systematic literature analysis in this study seeks to fill this gap by providing a deeper and more comprehensive understanding of the main challenges faced by primary school teachers in efforts to expand the digitization of education. By understanding these challenges, stakeholders in the education sector can devise more effective strategies to support teachers in integrating digital technology into their teaching. This in turn can help improve the quality of education and ensure that students get the full benefit of technological advancements.

In this survey, relevant previous studies will be analyzed to provide a comprehensive picture of the challenges faced by teachers in the digitization of education in primary schools. The results of this survey are expected to provide guidance and practical recommendations to overcome these challenges. Therefore, this systematic literature review has two main objectives:

i. Identify and classify the main challenges faced by primary school teachers in the implementation of digitalization of education based on previous studies.
ii. Analyze the causes behind the challenges, including factors such as lack of technological skills, inadequate infrastructure, and limited support.

To achieve this objective, there are two research questions namely;

i. What are the main challenges faced by primary school teachers in the implementation of digitalization of education?
ii. What are the causes that cause the challenge to occur?

Methodology

This study uses a systematic literature review approach to identify and analyze the challenges in expanding the digitization of education among teachers in primary schools. A systematic literature review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) 2020 method to critically analyze relevant articles for this study.

This approach involves a number of systematic and detailed main steps which are article search strategy, article selection criteria, article selection process, data collection and data analysis and research findings.

Article Search Strategy

First, this study begins the process by formulating a clear and specific research question, which will be a guide in finding and selecting relevant previous studies. A literature search was conducted through academic databases such as *Web of Science* and SCOPUS to ensure comprehensive coverage. Keywords such as "digitalization of education", "primary school teachers", "educational technology challenges", and "technology integration in teaching" were used to obtain relevant studies. The time period for the literature search was focused on articles published in the last five years (2019-2024) to ensure that the data collected is current and relevant as shown in Table 1.

Table 1
Database and keywords in article search

Database	Keywords	Duration
Scopus	(TITLE-ABS-KEY ("educational digitization") OR TITLE-ABS-KEY ("primary school teachers") OR TITLE-ABS-KEY ("educational technology challenges" OR "technology integration in teaching"))	2019-2024
Web of Science	(TITLE-ABS-KEY ("educational digitization") OR TITLE-ABS-KEY ("primary school teachers") OR TITLE-ABS-KEY ("educational technology challenges" OR "technology integration in teaching"))	2019-2024

Article Selection Criteria

Inclusive criteria used for the selection of articles include studies that focus on the digitization of education among primary school teachers, studies that discuss the challenges faced in the digitization process, and articles published in related academic journals and books. On the other hand, the exclusion criteria involved studies that were not relevant to the topic or did not focus on primary school teachers, articles published before 2018, and studies that did not have full access or only provided abstracts. Eligibility criteria and article selection exclusions are specified in Table 2.

Table 2
Eligibility and exclusion criteria

Criteria	Qualifications	Exceptions
Year	Between 2019-2024	2019 and earlier
Language	English, Malay	Besides English and Malay
Literary Genres	Journals, academic books	Studies do not have full access or only provide abstracts
Study focus	A study that focuses on the digitization of education among primary school teachers	Studies that are not relevant to the topic or do not focus on primary school teachers

Article Selection Process

Referring to Figure 1 the PRISMA Systematic Review Diagram, the article screening process is carried out in two stages. Initial screening involves screening based on titles and abstracts to determine suitability to the research topic. Articles that pass the initial screening will be screened again based on the full content to ensure they are relevant to the research question. The data from the selected articles will be analyze using a thematic analysis approach to identify the main themes and sub-themes related to the challenge of digitization of education. The results of this analysis are then synthesized in the form of a narrative to provide a comprehensive picture of the identified challenges. A total of 12 articles were identified and selected for the implementation of this systematic literature review.

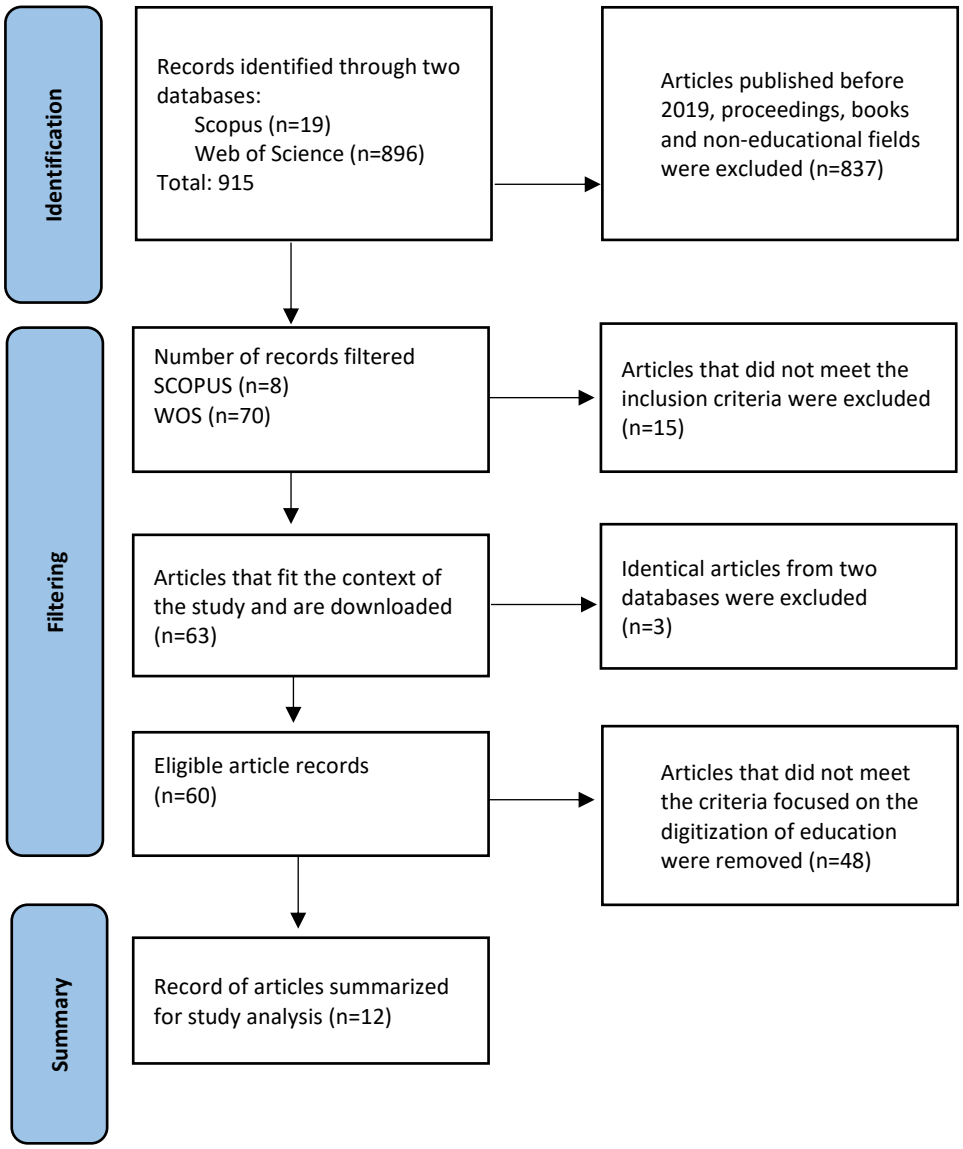

Figure 1 Systematic Review Prism
Adaptation from Page et al. (2021)

Data Collection and Data Analysis

Data collection involved 12 articles selected through a selection process from two database sources: SCOPUS and Web of Science. Data related to the author's name, title, year of

publication were extracted and systematically organized into Table 3 to streamline the synthesis process. With this systematic search strategy, the literature review is expected to provide an in-depth and practical insight into the challenges of expanding the digitalization of education among teachers in primary schools.

Table 3
List of Selected Research Articles

Articles	Author Name (Year)	Article Title
A1	Noor et al. (2023)	*Challenges Of Education In The Digital Era: Consistency Of Lifelong Learning Motivation Among Arabic Language Teachers*
A2	Costa et al. (2022)	*Teacher Professional Development in STEM Education: An Integrated Approach with Real-World Scenarios in Portugal*
A3	Martin et al. (2024)	*Primary school students' perceptions and developed artefacts and language from learning coding and computational thinking using the 3C model*
A4	Anh et al. (2023)	*Teachers' Perceptions and Readiness for Digital Transformation in Education: Empirical Evidence from Vietnam, a Developing Nation*
A5	Backfisch et al. (2021)	*Teachers' technology use for teaching: Comparing two explanatory mechanisms*
A6	Han, (2021)	*The relationships between teaching strategies, students' engagement in learning, and teachers' self-concept*
A7	Caena & Redecker (2019)	*Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (Digcompedu)*
A8	Nik Md. Saiful Azizi bin Nik Abdullah et al. (2021)	*Challenges of Digital Teaching Virtually and Student Readiness Post-Covid 19*
A9	Tengler et al. (2022)	*The Effect of Robotics-Based Storytelling Activities on Primary School Students' Computational Thinking*
A10	Yusfiziati & Yusof (2023)	*Empowering Students' Self-Learning Through the Flipped Classroom Method Using Digital Applications*
A11	Zakaria et al. (2023)	*Challenges of Education in The Digital Era: Consistency of Lifelong Learning Motivation Among Arabic Language Teachers.*
A12	Hong Nguyen et al. (2024)	*Elements affecting primary school teachers' digital competence in Vietnam's northern mountainous areas*

Decision

The articles that have been selected are based on the challenge of expanding the digitalization of education among teachers in primary schools. Table 4 shows the summary results from the research of 12 selected articles.

Table 4

Summary of the Results of the Study of the Selected Articles

Articles	Author (Year)	Challenge Category
A1	Noor et al. (2023)	• Limited technological infrastructure
A2	Costa et al. (2022)	• Technical support
A3	Martin et al. (2024)	• Limited technological infrastructure
A4	Anh et al. (2023)	• Training and professional development
A5	Backfisch et al. (2021)	• Limited technological infrastructure
A6	Han, (2021)	• Training and professional development
A7	Caena & Redecker (2019)	• Training and professional development
A8	Nik Md. Saiful Azizi bin Nik Abdullah et al. (2021)	• Technical support
A9	Tengler et al. (2022)	• Training and professional development
A10	Yusfiziati & Yusof (2023)	• Training and professional development
A11	Zakaria et al. (2023)	• Training and professional development
A12	Hong Nguyen et al. (2024)	• Training and professional development

Discussion

The rapid advancement of technology in recent decades has caused major changes in the field of education. The introduction of digital tools and applications such as computers, tablets, educational software, and online learning platforms have changed the way teaching and

learning are conducted in schools. Teachers now have access to more interactive and engaging educational resources, which can be tailored to the individual needs of students. For example, the use of interactive whiteboards and adaptive learning software allows teachers to create a more dynamic and responsive learning experience.

However, the development of this technology also brings certain challenges. Among the challenges involved are (1) Limited technological infrastructure; (2) Training and professional development and (3) Technical support. Table 5 shows the challenges that have been identified according to the articles that have been selected. Based on Figure 1, the challenge category of training and professional development is the most frequently studied challenge with a total of 7 studies (58%), followed by the challenge of limited technological infrastructure with a total of 3 studies (25%). While the challenge of technical support is the least mentioned in the study which is 2 studies (17%).

Overall, the development of technology in education offers great opportunities to improve the quality and effectiveness of learning. However, it requires strategic support and implementation to overcome inherent challenges and ensure that the benefits of technology can be enjoyed by all students regardless of their background.

Table 5
a study on the challenges of teachers in implementing digital education

Challenge Category	Number	Research
Limited technological infrastructure	3	Noor et al. (2023),Martin et al. (2024),Backfisch et al. (2021)
Training and professional development	7	Anh et al. (2023), Han, (2021), Caena & Redecker (2019),Tengler et al. (2022), Yusfiziati & Yusof (2023), Zakaria et al. (2023),Hong Nguyen et al. (2024)
Technical support	2	Costa et al. (2022), Nik Md. Saiful Azizi bin Nik Abdullah et al. (2021)

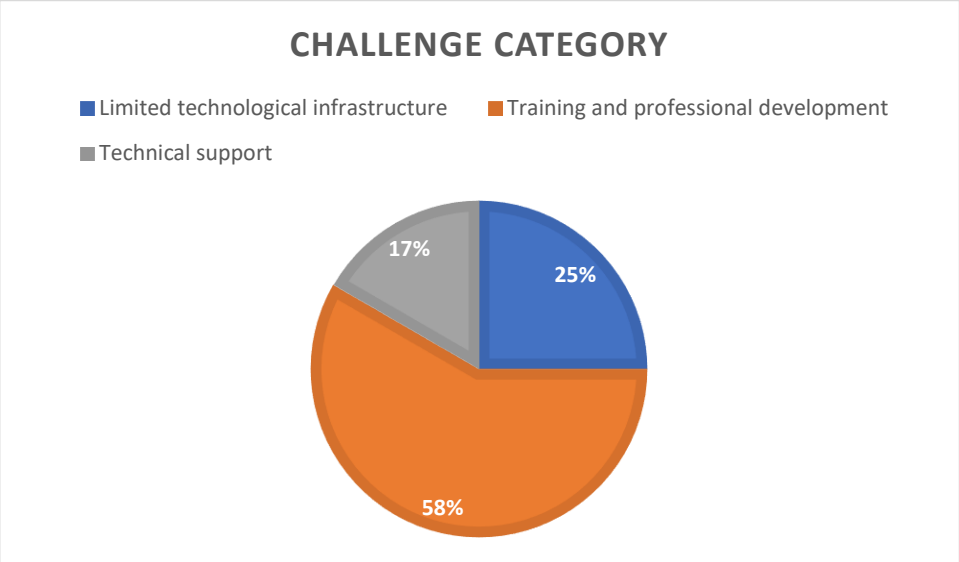

Figure 1 Challenge categories based on selected articles

Challenges in the Implementation of Educational Digitization

Based on previous studies, several major challenges have been identified in the implementation of digitalization of education among primary school teachers. These challenges can be classified into several main categories: infrastructure, training and professional development and technical support.

Limited technological infrastructure

One of the main challenges in the implementation of digitization of education in primary schools is the lack of sufficient technological infrastructure. Limited technology infrastructure includes the absence of sufficient digital devices such as computers, tablets, and projectors for students and teachers to use (Kaqinari, 2023). In addition, according to a study conducted by (Martin et al., 2024), poor or unstable internet connections in many schools, especially in rural areas, hinder the effective use of technology in teaching and learning. The absence of a computer lab or a dedicated space for the use of technology also limits the ability of teachers to integrate technology in their daily teaching activities (Backfisch et al., 2021). Studies show that this lack of infrastructure can cause unequal access to educational technology, further affecting the effectiveness of the teaching and learning process (Mohd Nor Azmi & Mohd Hamzah, 2023. Without adequate infrastructure, efforts to expand the digitization of education will continue to face insurmountable obstacles (Yaacob et al. 2024; Hong Nguyen et al. 2024).

Training and professional development

Training and professional development for teachers is another big challenge in the implementation of digitization of education in primary schools. Many teachers do not receive adequate or relevant training to use technology in their teaching (Mamat et al., 2021). The training programs provided are often sporadic and discontinuous, making it difficult for teachers to apply the technology skills learned in their daily teaching (Han, 2021;Caena & Redecker, 2019). In addition, the training provided may not be in line with the actual needs in the classroom, leaving teachers less confident to use technology effectively (Tengler et al., 2022). While according to the study (Hashim et al., 2022), lack of support in continuous professional development also makes it difficult for teachers to continue to improve their skills along with the development of technology. Without adequate and continuous training, teachers may feel overwhelmed and unmotivated to apply technology in teaching, preventing educational digitalization efforts from reaching their full potential.

Technical Support

According to Costa et al (2022), limited technical support is another major challenge in the implementation of digitization of education in primary schools. The absence of sufficient technical support staff causes teachers to face difficulties when faced with technical problems when using technology equipment in teaching. Without immediate and effective technical assistance, problems such as broken computers, malfunctioning software, or interrupted internet connections can affect the teaching and learning process. Additionally, Brianza et al (2022), lack of support in the maintenance of technology equipment results in the equipment quickly breaking down or not being able to be used properly, adding more burden to teachers

to find other alternatives. This situation can cause teachers to become less motivated to use technology in their teaching, at the same time preventing the digitization of education from achieving the desired goal. According to the study, adequate and responsive technical support is essential to ensure the continuous and effective use of technology in the classroom(Noor et al., 2023).Without adequate technical support, teachers may feel overwhelmed and lack the confidence to integrate technology into their daily teaching.

Analysis of the Causes of Challenges in the Digitalization of Education in Primary Schools

The digitization of education in primary schools is faced with various challenges arising from several basic factors. Here is an analysis of the main causes behind the challenge:

Lack of Technology Skills

An analysis of the causes of challenges in the digitization of education in primary schools highlights the lack of technology skills as one of the main factors that prevent the effective use of technology in the teaching and learning process (Mamat et al., 2021). The lack of technology skills among teachers may be due to several factors. First, many teachers may not receive adequate training or professional development in the use of educational technology. Lack of opportunities to engage in relevant training or to obtain support from technology experts may hinder the development of technology skills among teachers.

Second, the speed of technological development can also cause a lack of skills. In an environment where technology continues to evolve, teachers may have difficulty keeping up with the changes and learning the latest applications and tools that can be used in teaching. In addition, factors such as lack of access to quality technology devices and infrastructure can also affect teachers' technology skills. Without access to adequate devices and infrastructure, teachers may not have the opportunity to develop their technology skills.

To overcome this challenge, measures taken include providing quality training and professional development in the field of educational technology, increasing access to technology devices and infrastructure, and providing continuous support to teachers in the use of technology in their teaching. In this way, teachers will be more viable in using technology effectively in the teaching and learning process in primary schools.

Teachers' Inability or Uncertainty in Using Technology

The analysis of the causes of challenges in the digitization of education in primary schools highlights the inability or uncertainty of teachers in using technology as one of the main factors that prevent the effective use of technology in teaching and learning. This uncertainty may be due to several factors. The first factor, teachers may be less trained in the use of technology in the context of education. Inadequate training or lack of opportunities for professional learning in the field of educational technology can cause teachers to feel insecure in using technology tools and applications (Sulaiman et al., 2024).

Second, rapid changes in educational technology can also cause uncertainty among teachers. In an environment where technology continues to evolve, teachers may feel left behind or have trouble keeping up with the latest developments in educational technology. In addition, teachers' perception of technology can also affect their level of uncertainty. Some teachers may not be convinced about the added value of technology in the learning process, or may

have concerns about the possible negative impact of technology on social interaction and traditional learning abilities.

Overcoming teachers' inability or uncertainty in using technology requires a holistic approach that involves effective training, ongoing support, and professional development tailored to individual teachers' needs. In this way, teachers can gain the confidence and skills needed to effectively integrate technology in teaching and learning in primary schools.

Lack of Support and Leadership

Analysis of the root causes of challenges in the digitization of education in primary schools highlights the lack of support and leadership as critical factors that prevent the effective use of technology in the teaching and learning process. According to (Mohd Nor Azmi & Mohd Hamzah, 2023), Adequate support from the school administration as well as education authorities is important to encourage teachers to integrate technology in their teaching.

Lack of support can be reflected in many forms, including lack of financial resources for the purchase of technology devices, lack of training and professional development in the use of technology, as well as lack of access to the necessary digital infrastructure. In addition, the lack of effective leadership in encouraging the use of technology in education can also cause a lack of initiative and motivation among teachers.

Without adequate support and leadership, teachers may feel marginalized or unmotivated to use technology in their teaching. This can result in an imbalance in the implementation of technology among teachers, which in turn can prevent the achievement of optimal effects in student learning.

To overcome these challenges, school administrators need to play an important role in providing quality support to teachers, including providing the necessary training and professional development, ensuring access to adequate technology infrastructure, and providing encouragement and recognition to teachers who use technology. effectively in their teaching. In addition, effective school leadership needs to take the initiative in formulating policies that support the integration of technology in the school curriculum, as well as promote a progressive and innovative school culture. With strong support and leadership, teachers will be more motivated and ready to take steps towards effective digitization of education in primary schools.

Conclusion

This study has identified various challenges faced by primary school teachers in an effort to expand the use of technology in teaching and learning. By using a systematic literature review method with the PRISMA framework, this study has comprehensively researched the factors that influence the digitization of education at the primary school level. Among the challenges identified include lack of support and leadership, lack of access to technology devices and infrastructure and teachers' inability or uncertainty in using technology.

In conclusion, the digitization of education in primary schools faces significant challenges that require holistic and integrated action from various parties including school administration,

education authorities, and teachers themselves. By understanding these challenges and taking appropriate steps, we can accelerate the process of technology integration in teaching and learning, and thus improve the educational experience for primary school students.

This research makes significant contributions both theoretically and contextually. Theoretically, it enriches the existing body of knowledge by systematically categorizing the challenges faced by primary school teachers in the digitalization of education, a topic that has not been comprehensively explored in previous studies. By using the PRISMA methodology, this study ensures a rigorous and replicable process that other researchers can follow, thereby adding a layer of methodological robustness to the literature. Contextually, this research is particularly relevant to the Malaysian education system, providing insights into the specific challenges within this context. It highlights the unique obstacles faced by primary school teachers in Malaysia, such as infrastructural limitations and the need for localized professional development programs. These findings are crucial for local policymakers and educational leaders, enabling them to design targeted interventions that address these contextual challenges. Furthermore, this research underscores the importance of support and leadership in the successful integration of digital technology in education, offering a framework that can be adapted to similar contexts in other developing countries. Thus, this study not only advances theoretical understanding but also offers practical implications for improving educational outcomes in primary schools through effective digitalization strategies.

Appreciation
The author would like to express his gratitude to all those who have cooperated in completing the procedure in the research either directly or indirectly.

References

Anh, T. T. N., Phong, N. T., & Jan, A. (2023). Teachers' Perceptions and Readiness for Digital Transformation in Education: Empirical Evidence from Vietnam, a Developing Nation. *FWU Journal of Social Sciences*, 17(3), 86–99. https://doi.org/10.51709/19951272/FALL2023/7

Backfisch, I., Scherer, R., Siddiq, F., Lachner, A., & Scheiter, K. (2021). Teachers' technology use for teaching: Comparing two explanatory mechanisms. *Teaching and Teacher Education*, 104. https://doi.org/10.1016/j.tate.2021.103390

Caena, F., & Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (Digcompedu). *European Journal of Education*, 54(3), 356–369. https://doi.org/10.1111/ejed.12345

Costa, M. C., Domingos, A. M. D, Teodoro, V. D., & Vinhas, E. M. R. G. (2022). Teacher Professional Development in STEM Education: An Integrated Approach with Real-World Scenarios in Portugal. *Mathematics,* 10(21). https://doi.org/10.3390/math10213944

Han, F. (2021). The relationships between teaching strategies, students' engagement in learning, and teachers' self-concept. *Sustainability (Switzerland),* 13(9). https://doi.org/10.3390/su13095020

Hashim, S., Omar, M. K., Ab Jalil, H., & Sharef, N. (2022). Trends on Technologies and Artificial Intelligence in Education for Personalized Learning: Systematic Literature Review. International *Journal of Academic Research in Progressive Education and Development,* 11(1). https://doi.org/10.6007/ijarped/v11-i1/12230

Nguyen, H. C. T., Thi Thu, H. Le, Thuy, D. L., Thi Thu, H. N., & Thi Minh, T. D., (2024). Elements affecting primary school teachers' digital competence in Vietnam's northern mountainous areas. *Journal of Education and E-Learning Research,* 11(2), 292–301. https://doi.org/10.20448/jeelr.v11i2.5545

Kaqinari, T. (2023). Facilitators and Barriers to Online Teaching and Educational Technology Use by University Lecturers during COVID-19: A Systematic Review of Qualitative Evidence. *Trends in Higher Education*, 2(4), 636–666. https://doi.org/10.3390/higheredu2040038

Ministry of Education. (2023). *Digital Education Policy (Ministry of Education Malaysia, Ed*.). Multi Educational Book Enterprise.

Mamat, S., Ladin, C. A., Kamaruddin, A. Y., Omar, I. M., & Ismail, N. A., (2021). Covid-19: Challenges and Initiatives in Facing the Implementation of Blended Teaching and Learning. *Human Sciences*, 6(2). https://doi.org/10.33102/sainsinsani.vol6no2.319

Martin, D. A., Curtis, P., & Redmond, P. (2024). Primary school students' perceptions and developed artefacts and language from learning coding and computational thinking using the 3C model. *Journal of Computer Assisted Learning*. https://doi.org/10.1111/jcal.12972

Haslin, K., & Hamzah, I. M. (2023). Digitization Of Education: Readiness And Challenges For Students In Learning. *QALAM International Journal of Islamic and Humanities Research*, 3(1), 41–57.

Azmi, M. F. A., & Hamzah, M. I. (2023). Administrator Challenges in Managing Digital Change in Schools. *Malaysian Journal of Social Sciences and Humanities (MJSSH),* 8(4). https://doi.org/10.47405/mjssh.v8i4.2256

Nik, M. D., Abdullah, S. A. B. N., Ali, R., Yahya, N. N., & Isa,M. R. A. (2021). Challenges of Digital Teaching Virtually and Student Readiness Post Covid 19. *Sains Insani,* 6(2), 206–213. https://doi.org/10.33102/sainsinsani.vol6no2.317

Noor., Zakaria, S., Norul'azmi, A., Baharudin, H., Mohd, N., & Yusoff, R. N. (2023). Challenges Of Education In The Digital Era: Consistency Of Lifelong Learning Motivation Among Arabic Language Teachers. *Malaysian Online Journal of Education*, 7(2), 68–79.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J ., Grimshaw, J. M., Hrobjartsson, A., Lalu, M. M., Li, T., Loder, EW, Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *In The BMJ* (Vol. 372). BMJ Publishing Group. https://doi.org/10.1136/bmj.n71

Sulaiman, R. B. A., Bin Hassan, H., Kemanusiaan, S. P. (2024). E-Learning Readiness From the Aspects of Attitude, Literacy, Facilities and Access to Technology Among Religious Secondary School Students in the State of Pahang. *Al-Sirat Journal,* 24(1). https://ejournal.unipsas.edu.my/

Shamsuddin, N. S., & Abdullah, A. H. (2023). Teaching and Learning Mathematical Concepts Using Scratch Application Software: A Systematic Literature Review. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 8(12), e002639. https://doi.org/10.47405/mjssh.v8i12.2639

Tengler, K., Kastner-Hauler, O., Sabitzer, B., & Lavicza, Z. (2022). The Effect of Robotics-Based Storytelling Activities on Primary School Students' Computational Thinking. *Education Sciences*, 12(1). https://doi.org/10.3390/educsci12010010

Yusfiziati, A., & Yusof, M. (2023). Empowering Students' Self-Learning Through the Flipped Classroom Method Using Digital Applications. *International Journal of Society for Educational Initiatives,* 2(1), 10–14. https://www.researchgate.net/publication/369295660

Zakaria, N. S., Norul'Azmi, N. A., Baharudin, H., & Nik Yusoff, N. M. R. (2023). Challenges of Education in The Digital Era: Consistency of Lifelong Learning Motivation Among Arabic Language Teachers. *ATTARBAWIY: Malaysian Online Journal of Education,* 7(2). https://doi.org/10.53840/attarbawiy.v7i2.173