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The Influence of School Principals' Digital Leadership and Teacher Self-Efficacy on Teacher Technology Use

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Abstract. *The purpose of this study is to examine the effects of digital leadership and teacher self-efficacy on technology use by teachers. The study used a quantitative approach. The study began in March-May 2024. This study used a simple random sampling technique. The sample of this study was 169 teachers. The study was conducted in high schools in Sleman Regency, Yogyakarta. Data analysis used simple linear regression and multiple linear regression. Data collection techniques used questionnaires and documentation. The results of the study were that digital leadership had an impact on teacher technology use by an R2 value of 0.331, teacher self-efficacy influenced teacher technology use by an R2 value of 0.293, and together digital leadership and teacher self-efficacy influenced teacher technology use by an R2 value of 0403. Future researchers may conduct studies considering other variables, such as teacher motivation and school support, that may influence technology use.*

Keywords*: Digital Leadership, Teacher Self-Efficacy, Teacher's Technology Use*

INTRODUCTION

The use of technology by teachers as a medium or tool is something new in the world of education in Indonesia. This is stated in the Regulation of the Minister of Education and Culture in 2022 concerning the strategic plan of the Minister of Education regarding how the use of technology will be implemented in all educational units. This regulation and policy are new in Indonesia. Research results that technology can support learning have been applied in almost all developed countries that have very large access to technology (Xu et al., 2020). The appropriate use of technology by teachers can support efforts to create effective learning (Dinçer, 2018). However, research results show that the use of technology by teachers in the learning process is not yet optimal (Coman et al., 2020; Hidayah et al., 2020). In addition, research on the use of technology by teachers is still limited (Nuere & De Miguel, 2021; Schmid et al., 2023) Therefore, research on this topic needs to be done.

Research shows that teachers are the target of criticism regarding their failure to use technology because they choose not to use it (Means, 1994; Wang & Reeves, 2003). Teachers who adopt technology in learning have decreased and are not ready (Dewantoro & Andriani, 2022) due to conditions that limit teacher capacity, such as existing reforms and policies (Cuban, 2001; Fullan, 2015).

The use of technology by teachers is the use of digital tools to create a more dynamic and inclusive learning environment (Haleem et al., 2022). The appropriate use of technology in learning can increase the efficiency, interaction, and relevance of learning (Dikkers, 2013). Such as the use of technology through E-learning, mobile apps, and learning videos (Maria et al., 2023). Many factors influence the use of technology by teachers. These factors include digital leadership (AlAjmi, 2022; Ray et al., 2018) and teacher self-efficacy (Li et al., 2019). Therefore, the these factors are the ones most needed by teachers because digital leaders control and use technology to

explore their learning needs. (Rusnati & Gaffar, 2021), and teachers have self-efficacy in their readiness to do (Moore-Hayes, 2011).

Digital leadership is a key agent in the effective implementation of technology in schools. Digital leadership has the authority to determine the direction of the goals that the principal wants to achieve. The authority held is used for the implementation of technology in the learning process that still needs to be improved. Research results that aspects of digital leadership are Excellence in professional practice, visionary leadership, digital era learning culture, digital citizenship and systemic improvement. Therefore, digital leadership is needed. This statement is supported by research by that to ensure the use of existing technology in the classroom, in this case digital leadership is very necessary.

Digital leadership is a key agent in the effective implementation of technology in schools. Digital leadership has the authority to determine the direction of the goals to be achieved by the principal. The authority held is used for the implementation of technology in the learning process that still needs to be improved. The principal can determine the direction of policies that are in line with the integration of technology and the use of technology in school activities and management. Some things that the principal can do are policies for the availability of training, support, and technology infrastructure in schools Winter et al., (2021). The results of the study by Musid et al., (2022) that the aspects of digital leadership are Excellence in professional practice, visionary leadership, digital era learning culture, digital citizens and systemic improvement. Therefore, digital leadership is very much needed. This statement is supported by the research of Thannimalai & Raman, (2018) that to ensure the use of technology in the classroom, in this case digital leadership is very much needed.

In addition to the principal's digital leadership, teacher self-efficacy is also a further factor. Teacher self-efficacy is the belief in their ability to complete tasks and face difficulties related to their profession (McElroy, & Rutledge, 2023). The task carried out by the teacher is how to provide knowledge and fluency in the learning process. Teacher self-efficacy in utilizing technology in the classroom can support effective learning. The use of technology by teachers with a high sense of confidence will have an impact on students (Aljohani, 2022). If teachers do not have confidence that they can apply technology, it can be predicted that the learning process will have no direction. Kundu et al., (2020) said there are three domains for measuring self-efficacy, namely technological efficacy, pedagogical efficacy, integration efficacy.

Research Reaves & Cozzens, (2018) revealed that teachers have much higher self-efficacy in supportive schools. This indicates that teacher self-efficacy can also be influenced by good motivation so that the learning process can run smoothly as expected. In addition, leaders who can direct how to improve teacher self-efficacy better are digital leadership. In line with the opinion Ismail et al., (2021) that digital leadership can make a full contribution to increasing teacher confidence in the use of technology in the classroom.

Therefore, research on the use of technology in the school environment is important to do. So that researchers can take the formulation of the problem in the study, namely whether there is an influence of the principal's digital leadership and teacher self-efficacy in increasing the use of teacher technology in schools? The main objective of this study is to determine the influence of teacher leadership and self-efficacy in increasing the use of teacher technology in schools. Research on the use of teacher technology will add insight for policymakers in the field of education to focus on the digitalization of education, especially in schools.

METHOD

This study uses a quantitative research method with an explanatory research type, which aims to explain the cause-and-effect relationship between the variables studied. Explanatory research is research that tests between hypothesized variables (Lawrence Neuman, 2014)(Sugiyono, 2019). The study begun in March-May 2024. This study will involve teachers at State Senior High Schools

throughout Sleman Regency, Yogyakarta using a sampling technique, namely simple random sampling. This technique takes sample members from the population randomly without considering the strata of respondents (Sugiyono, 2019), because it can increase the representation of the general population and minimize bias so that this research is not subjective. Therefore, the sample of this study was 169 teachers. The research instrument is a tool to obtain data, where this study uses questionnaires and documentation. The researcher conducted instrument development which means the researcher compiled and developed the instrument himself through stages from Ediyanto et al., (2022) namely Information collecting (the problems that exist, the importance of the research conducted), planning (preparing the plans needed to develop the instrument), initial product development (showing the process and results of initial product development), validation and revision (Expert validation and field validation). Furthermore, the researcher conducted the research, namely the questionnaire was distributed to the respondents. The data that has been collected will then be analyzed using descriptive analysis techniques, classical assumption tests, and simple and multiple regression analysis tests (Ghozali, 2016). Simple and multiple analysis tests to determine the direct and indirect effects on independent and dependent variables (Ghozali, 2016). Therefore, the researcher displays the research steps shown in Figure 1 below:

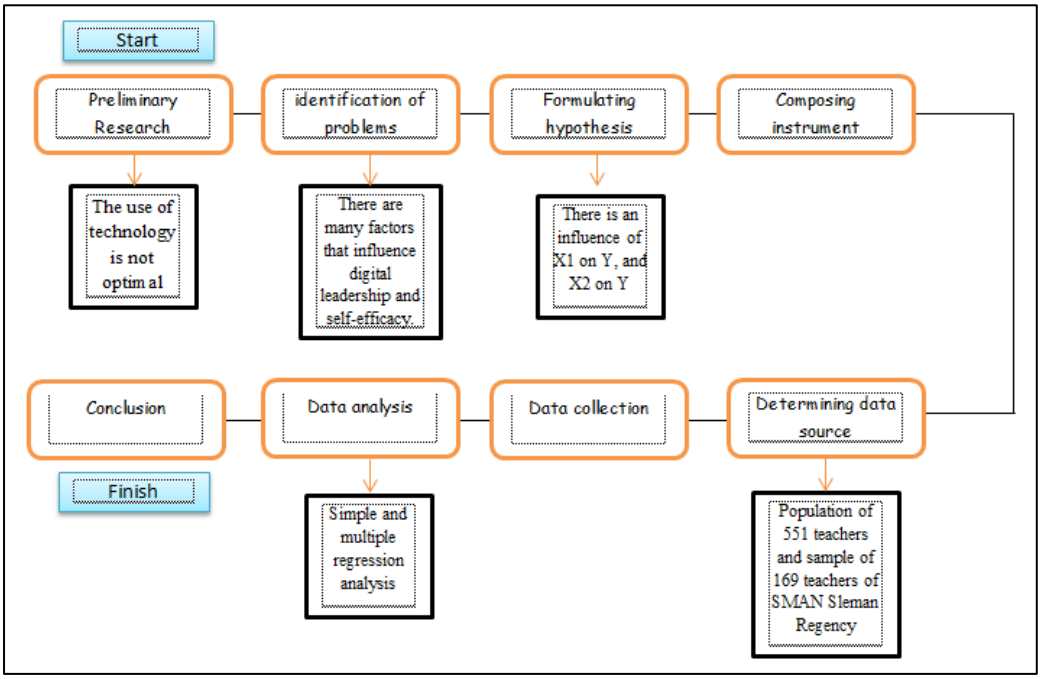

Figure 1. Step Research

FINDINGS

This study aims to determine how much influence digital leadership and teacher self-efficacy have in influencing digital leadership in schools. The results of the study can be included in the hypothesis test conducted through the following simple linear test and multiple linear test:

Simple Linear Regression: Digital Leadership (X1) towards Teachers' Use of Technology (Y) and Teacher self-efficacy (X2) towards teacher technology use (Y)

The following are the results of a simple linear test which will be interpreted in the following table 1.

Tabel 1. Hypothesis Test of Principal's Digital Leadership on Teacher's Use of Technology

Independent variable	Constants	Regression coefficient	T	F	Sig	R^2
Digital Leadership	48,759	0,390	3,830	14,699	0.000	0.331

Based on table 1 shows the result of a regression test between variable X1 and Y is determined through the equation Y = a + bX1 = 48.759 + 0.390X1. The constant value obtained is 48.759 with the note that there is no influence from other variables or in other words if the Principal's Digital Leadership variable does not exist, then the constant value of the teacher technology usage variable is 48.759. The regression coefficient value of X1 against Y is 0.390 which indicates that for every one-unit increase in the Principal's Digital Leadership variable, the value of the teacher's technology usage variable increases by 0.390. The R2 value obtained is 0.331 which means that the Principal's Digital Leadership variable influences the teacher's technology usage by 33.1% while the remaining 66.9% is influenced by other factors.

Tabel 2. Hypothesis Test of Teacher Self-Efficacy on Teacher Technology Use

Independent variable	Constants	Regression coefficient	T	F	Sig	R^2
Teacher Self-Efficacy	64,762	0,378	0,344	11,185	0,001	0,293

Based on table 2 shows that the result of a regression test between variable X2 and Y is determined through the equation Y = a + bX2 = 64.762 + 0.378X2. The constant value obtained is 64.762 with the note that there is no influence from other variables or in other words if the teacher self-efficacy variable does not exist, then the constant value of the teacher technology use variable is 64.762. The regression coefficient value of X1 against Y is 0.378 which indicates that for every one-unit increase in the teacher self-efficacy variable, the value of the teacher technology use variable increases by 0.378. The R2 value obtained is 0.293 which means that the teacher self-efficacy variable influences the teacher technology use by 29.3% while the remaining 70.7% is influenced by other factors.

Multiple Linear Regression: Digital Leadership (X1) and Teacher Self-efficacy (X2) towards Teacher Technology Use (Y)

The following are the results of a simple linear test which will be interpreted in the following table 3:

Tabel 3. Hypothesis Test of Digital Leadership and Teacher Self-Efficacy on Teacher Technology Use

Independent variable	Constants	Regression coefficient	T	F	Sig	R^2
Digital Leadership	22,904	0,380	4,130	8,420	0,000	0,403
Self Efficacy		0,367	3,636			

Based on table 3, the results of multiple linear regression on the variables of Digital Leadership and teacher self-efficacy on the use of teacher technology can be determined by the equation Y = a + bX1 + bX2 = 22,904 + 0,380X1 + 0,367X2. The constant value of 22,904 indicates that the variables of Digital Leadership and teacher self-efficacy if if not influenced by other variables, then the use of teacher technology will remain at 22,904. Meanwhile, the regression coefficient of X1 against Y of 0,380 indicates that every one unit increase in the Digital Leadership variable will cause an increase of 0.380 in the value of teacher technology use. The value of the regression coefficient of X2 against Y is 0.367 which indicates that every one unit change in the self-efficacy variable, the value of teacher technology use will increase by 0,367. The R2 value of 0.403 indicates that the variables of Digital Leadership and teacher self-efficacy have an impact on the use of teacher technology.

DISCUSSION

How digital leadership has impact on teacher technology use

In the context of the principal as a digital leader, digital leadership refers to the ability of a principal to manage, lead, and inspire teachers and school staff in adopting and utilizing technology to support the teaching and learning process and education management effectively and efficiently (Sheninger, 2019)(Eryeşil, 2021). Leaders who have the ability to direct to a digital environment are a form of leadership that answers the challenges of the current era. Research conducted by Oberer & Erkollar, (2018) suggests that digital leadership is one of the leadership styles needed today. Leaders must be able to answer all kinds of challenges, such as digital leadership.

Digital leadership in the school environment has an impact on the technology that is integrated (AlAjmi, 2022). Teachers who understand how technology can help the learning process must try to integrate technology in the classroom. The use of this technology is part of the teacher's activity plan. Zeng, (2022) said that the technology used by teachers is a type of technology that helps simplify learning and can be accepted and understood by students. 5 pillars of leadership are aspects of digital leadership. The five pillars put forward are a) Excellence in professional practice, namely principals and teachers to continuously improve their skills and knowledge through ongoing training, professional collaboration, and the application of innovative teaching methods, b) visionary leadership, namely the ability of principals to formulate a clear and strategic vision regarding the future of education, c) digital era learning culture, namely the application of technology to support the teaching and learning process, d) digital citizenship, namely in schools teaching students about the importance of ethical behavior and responsibility in using technology, and e) systemic improvement, namely continuous efforts to improve the entire education system, both in terms of curriculum, teaching methods, and school management.

The first finding is that principals who prioritize excellence in professional practice in the digital leadership dimension are leaders who are committed to advancing learning and administration through the effective use of technology (Garcia, 2020). They not only master technology but are also able to integrate it into the school culture, encourage innovation, and increase student and teacher engagement. With a clear vision, these principals encourage continuous professional development, ensuring that all staff have the digital skills needed to succeed in the digital era.

The second finding is that principals who have visionary leadership in the digital leadership dimension are able to project a future of education that is integrated with technology holistically. They not only understand the importance of technological innovation but also have a clear vision of how technology can be used to improve the quality of learning, operational efficiency, and engagement of all stakeholders. With visionary leadership, principals encourage a digital culture in schools, ensuring that teachers, students, and staff have the skills and resources needed to utilize technology effectively (Thannimalai & Raman, 2018). They are also proactive in identifying relevant digital trends and implementing strategies that enable schools to continue to thrive in the digital era.

The third finding is through strong digital leadership. School leaders, such as principals and supervisors, play a key role in guiding the vision and strategy for digital transformation, ensuring that the curriculum, teaching methods, and school management adapt to the needs of the times (Martínez-Caro et al., 2020). They encourage the use of technology in learning, such as e-learning platforms, online collaboration tools, and educational data analytics to monitor student progress. This digital leadership also includes empowering teachers with ongoing training in the use of technology, as well as creating a culture of innovation where experimentation and adoption of new digital tools become an integral part of daily practice. Research by Raygan & Moradkhani, (2022) found a positive relationship between principals' digital leadership and digital teacher practices. Principals who have high digital leadership tend to create an environment that supports technological innovation, training and a digital era work culture as the main supporting factors.

According to Leary et al., (2021), the level of teacher familiarity with digital tools greatly influences the effectiveness of technology adoption. Principals who support teacher competency development can overcome differences in access and attitudes towards technology.

The fourth finding is that principals are able to integrate technology wisely, ethically, and responsibly into every aspect of school management (Buchholz et al., 2020). They not only understand the importance of digital literacy for students and staff but also lead by setting an example of positive online behavior, prioritizing transparency, security, and inclusivity. As leaders, they encourage a healthy digital culture in the school environment by implementing policies that support the productive use of technology and ensuring that all school members are trained to understand and practice digital ethics in their daily activities.

The fifth finding is that principals need to strategically integrate technology into all aspects of school operations. This involves developing a clear vision for how technology can be used to support learning and school management and ensuring that all staff members have the skills necessary to use technology effectively (Guillen et al., 2020). Principals should also foster a culture of innovation by providing ongoing training, adopting digital platforms for communication and collaboration, and using data effectively to make decisions that improve performance. With this approach, principals can ensure that the entire school ecosystem is moving in a more progressive and responsive direction to rapid technological change.

Digital leadership refers to the ability of leaders, such as principals or heads of educational institutions, to integrate technology into the learning and administration process. Leaders who have digital competence are able to create a clear vision of how technology can improve the effectiveness of teaching and learning, and support teachers in adopting new technologies through training and provision of resources (Uğur & Koç, 2019). In addition, this article highlights that effective digital leadership is not only about introducing new technologies, but also about how leaders are able to motivate and support teachers in using these technologies. Leaders who are actively involved in this process can help reduce the psychological and technical barriers that teachers may face. By providing examples of the use of technology in learning, leaders can inspire and model for teachers to follow, so that the use of technology becomes more equitable and effective across the institution (Taufiqurrahman, 2021). Good digital leadership also involves creating a collaborative culture where teachers can share experiences and strategies in using technology. With strong support from leaders, teachers feel more confident and motivated to continue exploring and developing their technology skills. Overall, effective digital leadership can encourage wider adoption of technology and have a positive impact on the quality of teaching and student learning outcomes.

How teacher self-efficacy has an impact on teacher technology use

Self-efficacy means teachers' belief that they have the skills and abilities to use technology effectively in the teaching and learning process (Kundu et al., 2020). Self-efficacy is a key factor that influences the extent to which a teacher feels comfortable and confident in integrating technology into the classroom. Teachers who have high levels of self-efficacy tend to be more open to technological innovations and are able to face challenges that may arise when using new technological tools (Mia Kim Williams et al., 2023). Kundu et al., (2020) revealed that there are three domains that can measure teacher self-efficacy through three domains, namely: technological efficacy, pedagogical efficacy, integration efficacy.

The first finding is that teachers with technological efficacy are able to utilize digital tools and applications effectively to enhance the learning process. The first finding is that teachers with technological efficacy are able to utilize digital devices and applications effectively to enhance the learning process. These digital devices include computers, internet services, web learning, and others. They not only understand how to use technology but also have the confidence to integrate these tools into their curriculum. Teachers with technological efficacy can select and implement

digital tools that are appropriate to students' needs, design interactive learning activities, and utilize data and feedback from technology to adjust their teaching methods (M K Williams et al., 2023). This ability creates a more dynamic and adaptive learning environment, facilitates the development of 21st century skills in students, and bridges the gap between traditional and digital teaching methods.

The second finding is that teachers with pedagogical efficacy tend to have a deep understanding of learning theory and practical skills in managing the classroom, creating a positive learning environment, and adjusting their approach to the individual needs of students (Gilkes, 2020). They also actively evaluate and adjust their teaching methods based on feedback and evaluation results so that they can provide a more meaningful and effective learning experience. The key to this pedagogical effectiveness lies in the teacher's commitment to continue learning and adapting in their profession.

The third finding is that teachers with high integration efficacy are able to align various resources and techniques to meet students' learning needs, facilitate deep understanding, and increase student engagement (Gomez et al., 2022). They can also adapt teaching strategies to technological developments and curriculum changes, creating a dynamic and adaptive learning environment. These skills are essential to ensuring that learning is not only effective but also relevant to the challenges and needs of the modern era.

There is relevant research on how self-efficacy can affect teacher technology use. Research by Haixia et al., (2018) suggests that teacher beliefs have an impact on how teachers can use technology in the classroom. This is in line with what O'Neal et al., (2017) was stated that teachers can use technology in the classroom because they have a strong belief that they are capable and can use it. In this article, the researcher also emphasized that teachers who are confident in their abilities tend to have a more proactive approach in exploring and utilizing technology. They not only use technology to support learning, but also to increase student engagement and enrich the learning experience. With strong self-efficacy, teachers are more likely to develop their technology skills and seek additional resources to support their teaching (Backfisch et al., 2020).

However, this article also highlights that lack of self-efficacy can be a barrier for teachers in using technology effectively. Teachers who feel less confident tend to avoid using technology or only use tools they are familiar with, thus reducing the potential for innovation in teaching. Therefore, it is important to provide adequate support and training to teachers to improve their self-efficacy, so that they can be more effective in integrating technology into their teaching practices.

CONCLUSION

Based on the results of the analysis and discussion that have been presented, digital leadership and teacher self-efficacy have a significant influence on the use of teacher technology in schools. Digital leadership has an R2 value of 0.331. This indicates that 33.1% of the principal's digital leadership influences the use of teacher technology and teacher self-efficacy has an R2 value of 0.293, this indicates that 29.3% of teacher self-efficacy influences the use of teacher technology. Principals who have the soul of a digital leader and teachers have strong confidence in the technology used will ultimately have an impact on the learning process.

This study is limited because the variables used are few so that further research can look for other variables that can affect teacher technology use. In addition, further research should explore more with different methods such as in-depth interviews so that technology use can be classified precisely about what type of technology to use.

REFERENCES

AlAjmi, M. K. (2022). The impact of digital leadership on teachers' technology integration during the COVID-19 pandemic in Kuwait. *International Journal of Educational Research*, *112*, 101928. https://doi.org/https://doi.org/10.1016/j.ijer.2022.101928https://doi.org/10.1016/j.ijer.2022.101928

Aljohani, N. J. (2022). Teacher Self-Efficacy Beliefs and the Integration of Interactive Website Wikispaces Classroom. *International Journal of Web-Based Learning and Teaching Technologies*, *17*(1), 1–17. https://doi.org/10.4018/ijwltt.313192https://doi.org/10.4018/IJWLTT.313192

Backfisch, I., Lachner, A., Hische, C., Loose, F., & Scheiter, K. (2020). Professional knowledge or motivation? Investigating the role of teachers' expertise on the quality of technology-enhanced lesson plans. *Learning and Instruction*, *66*, 101300. https://doi.org/10.1016/j.learninstruc.2019.101300

Buchholz, B. A., DeHart, J., & Moorman, G. (2020). Digital citizenship during a global pandemic: Moving beyond digital literacy. *Journal of Adolescent & Adult Literacy*, *64*(1), 11–17. https://doi.org/10.1002/jaal.1076

Coman, C., Țîru, L. G., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective. *Sustainability*, *12*(24), 10367. https://doi.org/10.3390/su122410367

Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Harvard university press.

Dewantoro, D., & Andriani, D. E. (2022). Permasalahan-permasalahan Pendidikan yang Dihadapi Sekolah di Tahun Pertama Pandemi Covid-19. *Jurnal Manajemen Pendidikan: Jurnal Ilmiah Administrasi, Manajemen Dan Kepemimpinan Pendidikan*, *4*(1), 97–113.

Dikkers, S. M. (2013). Promote the use of the most effective and appropriate technologies to support teaching and learning. In *The new instructional leadership* (pp. 147–167). Routledge.

Dinçer, S. (2018). Are preservice teachers really literate enough to integrate technology in their classroom practice? Determining the technology literacy level of preservice teachers. *Education and Information Technologies*, *23*, 2699–2718. https://doi.org/10.1007/s10639-018-9737-z

Ediyanto, E., Sunandar, A., Ramadhani, R. S., & Aqilah, T. S. (2022). Sustainable Instrument Development in Educational Research. *Discourse and Communication for Sustainable Education*, *13*(1), 37–47. https://doi.org/10.2478/dcse-2022-0004https://doi.org/10.2478/dcse-2022-0004

Eryeşil, K. (2021). Digital leadership, leadership paradigm of the digital age: A conceptual framework. *Equinox Journal of Economics Business and Political Studies*, *8*(1), 98–112. https://doi.org/10.48064/equinox.885320

Fullan, M. (2015). *The new meaning of educational change*. Teachers college press.

Garcia, R. (2020). *Leading for Excellence: Leadership Behaviors that Support a High-Achieving School Climate*. Brandman University.

Ghozali, I. (2016). *Aplikasi analisis multivariete dengan program IBM SPSS 23*.

Gilkes, A. L. (2020). *Teachers' knowledge and self-efficacy beliefs as factors affecting technology integration practices*. Walden University.

Gomez, F. C., Trespalacios, J., Hsu, Y.-C., & Yang, D. (2022). Exploring teachers' technology integration self-efficacy through the 2017 ISTE Standards. *TechTrends*, 1–13. https://doi.org/10.1007/s11528-021-00639-z

Guillen, D., Gomez, D., Hernandez, I., Charris, D., Gonzalez, J., Leon, D., & Sanjuan, M. (2020). Integrated methodology for industrial facilities management and design based on FCA and lean manufacturing principles. *Facilities*, *38*(7/8), 523–538. https://doi.org/10.1108/F-03-2019-0040

Haixia, L., Koehler, M., & Wang, L. (2018). The impact of teachers' beliefs on their different uses of technology. *Society for Information Technology & Teacher Education International Conference*, 1468–1477.

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275–285. https://doi.org/10.1016/j.susoc.2022.05.004

Hidayah, R., Susiani, T. S., & Salimi, M. (2020). How elementary school teachers use ICT-based learning media? *Journal of Physics: Conference Series*, *1511*(1), 12015.

Ismail, S. N., Omar, M. N., & Raman, A. (2021). The authority of principals' technology leadership in empowering teachers' self-efficacy towards ict use. *International Journal of Evaluation and Research in Education*, *10*(3), 878–885. https://doi.org/10.11591/ijere.v10i3.21816

Kundu, A., Bej, T., & Dey, K. N. (2020). An empirical study on the correlation between teacher efficacy and ICT infrastructure. *International Journal of Information and Learning Technology*, *37*(4), 213–238. https://doi.org/10.1108/IJILT-04-2020-0050https://doi.org/10.1108/IJILT-04-2020-0050

Lawrence Neuman, W. (2014). *Social research methods: Qualitative and quantitative approaches*. Pearson.

Leary, H., Lee, V. R., & Recker, M. (2021). It's more than just technology adoption: Understanding variations in teachers' use of an online planning tool. *TechTrends*, *65*(3), 269–277. https://doi.org/10.1007/s11528-020-00576-3

Li, Y., Garza, V., Keicher, A., & Popov, V. (2019). Predicting high school teacher use of technology: Pedagogical beliefs, technological beliefs and attitudes, and teacher training. *Technology, Knowledge and Learning*, *24*, 501–518.

Maria, P., Wahyuningrum, E., Jamil, M. A., Nawawi, M. L., Aditia, D., Gusti, N., & Lia, A. (2023). *Analisis Efektivitas Penggunaan Teknologi dalam Pendidikan Terhadap Peningkatan Hasil Belajar*. *06*(01), 1–11.

Martínez-Caro, E., Cegarra-Navarro, J. G., & Alfonso-Ruiz, F. J. (2020). Digital technologies and firm performance: The role of digital organisational culture. *Technological Forecasting and Social Change*, *154*, 119962. https://doi.org/10.1016/j.techfore.2020.119962

Means, B. (1994). Technology and education reform: The reality behind the promise. *(No Title)*.

Moore-Hayes, C. (2011). Technology Integration Preparedness and its Influence on Teacher---Efficacy. *Canadian Journal of Learning and Technology*, *37*(3), 1–15. https://doi.org/10.21432/T2B597

Musid, N. A., Matore, M. E. E. M., & Hamid, A. H. A. (2022). Digital Leadership with The Constructs Diversity: A Systematic Literature Review. *Mathematical Statistician and Engineering Applications*, *71*(4), 2182–2202.

Nuere, S., & De Miguel, L. (2021). The digital/technological connection with COVID-19: An unprecedented challenge in university teaching. *Technology, Knowledge and Learning*, *26*(4), 931–943.

O'Neal, L. J., Gibson, P., & Cotten, S. R. (2017). Elementary school teachers' beliefs about the role of technology in 21st-century teaching and learning. *Computers in the Schools*, *34*(3), 192–206. https://doi.org/10.1080/07380569.2017.1347443

Oberer, B., & Erkollar, A. (2018). Leadership 4.0: Digital leaders in the age of industry 4.0. *International Journal of Organizational Leadership*.

Ray, B., Ed, D., Lee, S., Ph, D., & Education, K.-. (2018). Teachers ' Perceptions of Principal Digital Leadership Behaviors that Impact Technology Use in The Classroom. *Dallas Baptist University ProQuest Dissertations Publishing*. https://doi.org/10981886

Raygan, A., & Moradkhani, S. (2022). Factors influencing technology integration in an EFL context: investigating EFL teachers' attitudes, TPACK level, and educational climate. *Computer Assisted Language Learning*, *35*(8), 1789–1810.

Reaves, S. J., & Cozzens, J. A. (2018). Teacher perceptions of climate, motivation, and self-efficacy: Is there really a connection. *Journal of Education and Training Studies*, *6*(12), 48–67.

Rusnati, I., & Gaffar, M. F. (2021). *Implementation of Pr incipal ' s Digital Leadership in Communication and Teacher Professional Development at School*. *526*(Icream 2020), 90–95.

Schmid, R., Pauli, C., & Petko, D. (2023). Examining the use of digital technology in schools with

a school-wide approach to personalized learning. *Educational Technology Research and Development*, *71*(2), 367–390. https://doi.org/10.1007/s11423-022-10167-z

Sheninger, E. (2019). *Digital leadership: Changing paradigms for changing times*. Corwin Press. https://doi.org/10.21125/inted.2019.2528

Sugiyono, S. (2019). Metodologi Penelitian Kualitatif Kuantitatif Dan R&D. *Bandung: Cv. Alfabeta*.

Taufiqurrahman. (2021). Kepemiminan Kepala Sekolah di Era Digital. *Proceeding: Islamic University of Kalimantan*, *1*(1). https://doi.org/10.1515/bpasts-2016-0041

Thannimalai, R., & Raman, A. (2018). Principals technology leadership and teachers technology integration in the 21st century classroom. *International Journal of Civil Engineering and Technology*, *9*(2), 177–187.

Uğur, N. G., & Koç, T. (2019). Leading and Teaching with Technology: School Principals' Perspective. *International Journal of Educational Leadership and Management*, *7*(1), 42. https://doi.org/10.17583/ijelm.2019.3758https://doi.org/10.17583/ijelm.2019.3758

Wang, F., & Reeves, T. C. (2003). *Why Do Teachers Need to Use Technology in Their Classrooms ? Issues , Problems , and Solutions*. *20*(4), 49–66. https://doi.org/10.1300/J025v20n04_05

Williams, M K, Christensen, R., McElroy, D., & ... (2023). Teacher self-efficacy in technology integration as a critical component in designing technology-infused teacher preparation programs. … *Issues in Technology* …, *23*, 228–259. https://www.learntechlib.org/p/221546/

Williams, Mia Kim, Christensen, R., McElroy, D., & Rutledge, D. (2023). Teacher self-efficacy in technology integration as a critical component in designing technology-infused teacher preparation programs. *Contemporary Issues in Technology and Teacher Education*, *23*(1), 228–259.

Winter, E., Costello, A., O'Brien, M., & Hickey, G. (2021). Teachers' use of technology and the impact of Covid-19. *Irish Educational Studies*, *40*(2), 235–246. https://doi.org/10.1080/03323315.2021.1916559https://doi.org/10.1080/03323315.2021.1916559

Xu, M., Williams, P. J., Gu, J., & Zhang, H. (2020). Hotspots and trends of technology education in the International Journal of Technology and Design Education: 2000–2018. *International Journal of Technology and Design Education*, *30*(2), 207–224. https://doi.org/10.1007/s10798-019-09508-6

Zeng, Y. (2022). Analysing Teacher Knowledge for Technology Use among Secondary Teachers Teaching Chinese as a Foreign Language (CFL) in Australia. *Journal of Curriculum and Teaching*, *11*(2), 15–28. https://doi.org/10.5430/jct.v11n2p15https://doi.org/10.5430/jct.v11n2p15