The Influence of Digital Literacy of Teachers on the Implementation of Online Learning at High Schools in Gowa Regency

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Abstract

In connection with the efforts to improve the quality of education in the 21st century, teachers are demanded for their professionalism and are obliged to develop academic qualifications and competences in a sustainable manner in line with the development of science, technology, and arts. The use of digital information technology in the learning process first requires teachers to speak against all information technology and digital developments. This is necessary to support the education system as well as the development of digital learning resources so that students can access them using technology. Based on this, research was carried out aimed at finding out the influence of digital literacy among teachers on the implementation of online learning. This research is being carried out throughout the state high schools in Gowa Regency. The population in this study is a total of 238 civil service teachers spread across five schools. Sampling was done using the random proportional sampling technique with samples of 70 teachers based on the Slovin formula. The data collection technique uses a questionnaire that tests the validity of the contents using the gregory test model and the validation of the construction using the confirmatory factor analysis technique, and the rehabilitation test using the Cronbach alpha formula, which produces a reliability coefficient value of 0.98 for the teacher's digital literacy instrument and a reliability coefficient of 0.96 for the online learning implementation instrument. The simple linear regression technique is used to analyze the data obtained. The results of the study revealed that there is a positive and significant influence of the digital literacy of teachers on the implementation of online learning at the State High School Preventing Education in Gowa Regency, and the great contribution or impact of the digital literature of the teacher on online learning implementation is 48%. There are findings in this study that reveal that there is a positive and significant influence of digital literacy teachers on the implementation of online learning. This shows that the quality of learning online is determined by the professionalism of teachers in the aspect of the ability to use digital technology.

Keywords*: Teacher, Digital literacy, Online learning*

1. Introduction

In the educational process, the teacher is one of the factors that determines the success of the student, and in the learning process of teaching, the teacher is not only required to be able to deliver the material of the lesson and master the material but also must be capable of activating the student in the process of learning (Mameli et al., 2020). The teacher should always strive to provide guidance and always encourage the learning spirit of the students, to organize the learning activities as best as possible, and to be a medium of information that the student needs in the field of knowledge, skills, and attitudes (Koivuniemi et al., 2018).

In connection with the efforts to improve the quality of education in the 21st century, teachers are demanded for their professionalism and are obliged to develop academic qualifications and competences in a sustainable manner in line with the development of science, technology, and the arts (Alghamdi & Al-Ghamdi, 2021). A professional teacher is required to understand and master technology to support a teacher's ability to keep up with the developments of the times. Besides, the development of technology and the Internet can help teachers in the learning process in the classroom (Hasse, 2017).

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To create education and learning that has a coherence of yoga in line with the technological developments that have now evolved. In the 21st century, technological developments in the field of education are progressing, which can be considered one of the strategies for developing a learning system (Gurevich et al., 2017). Teachers can provide services without having to deal directly with students; likewise, students can obtain information from a wide range of sources through cyberspace using computers or the Internet (Ngabiyanto et al., 2021).

Indonesian education at the beginning of 2020 is faced with a challenge in the midst of the pandemic of the Covid-19 virus. With the spread of the virus, the government encourages the public to do activities from home (Arifianto et al., 2021). The Covid-19 pandemic also had an impact on the education sector, where the government through the Ministry of Education and Culture issued a policy containing the implementation of education during the emergency period of the spread of the Covid-19 virus. The policy states that the teaching and learning process is carried out at home through online or distance learning which aims to provide a meaningful learning experience for students without any demands to complete both the achievements of the grade promotion curriculum and graduation (Aliyyah et al., 2020).

The implementation of online learning was carried out as one of the efforts to maintain the educational objectives in Indonesia amid the pandemic of COVID-19 as well as efforts to prevent the spread of the virus (Febrianto et al., 2020). Previous research by (Dhawan, 2020) suggested that online learning could save the education system during the COVID-19 crisis because it offers a lot of flexibility in terms of time and location, adapts the learning process to the needs of pupils, strongly supports and facilitates all teaching and learning activities, and helps in providing inclusive education even in the time of the COVID-19 pandemic crisis.

Based on the author's direct observation of the policy that encourages teachers to learn online, it was found that teachers should be more interactive and creative in using digital technology to deliver learning so that students do not fall behind. In the case of state high schools in Gowa district, students and teachers are not recommended to do face-to-face teaching activities but to teach from home. In this case, teaching is done online. This, of course, requires mastery of information technology science, especially digital literacy skills, for teachers and students to keep online learning running effectively in the midst of pandemic times.

Further, the results of interviews with some teachers of high schools in Gowa district were that teachers had implemented online learning during the time the government's policy was issued, and then it was also presented that there are still teachers in the high school of the state that have minimal understanding of digitalization in the online learning process, either in the preparation of teaching or application in the learning process, due to the limitation of the teacher's competence in operating digital devices and age over the 40s, while the school has facilities. Meanwhile, the data (Kemdikbud, 2020) showed that the main obstacle to teachers in implementing online advertising is their inability to operate digital devices, for 67.11% of the survey results carried out.

The use of digital information technology in the learning process first requires teachers to speak against all information technology and digital development (Pongsakdi et al., 2021). Revealed by (Cruzado & Santiago, 2021) that teachers must use digital language to use technology in conveying and supporting the education system, and teachers need to develop digital learning resources to be accessible to learners using technology. Teachers with learners should use digital technology in facilitating learning because the primary role of digital teachers is as a facilitator of learning (Nabhan, 2021).

By applying online learning, absolute digital literacy competence is required and should be owned by the teacher. From the description concerning the central role of digital literature competence in the implementation of online learning, the research is carried out aimed at knowing the influence of the digital literacy of teachers on online learning implementation at the State High School of Education in the district of Gowa.

The implementation of online learning is a learning process carried out by teachers using electronic devices, information technology, and internet access as a learning medium for delivering materials. The implementation of online learning can be measured through indicators, 1) Online learning time adjusts to the agreement of the pupils and their parents or guardians; 2) Virtual face-to-face learning between teachers and students in person; 3) Teachers use learning management systems (LMS); 4) Use electronic equipment, information technologies, and internet access as learning media in disseminating materials; 5) Learning can take place anywhere; 6) Learning is implemented to provide a meaningful learning experience for students; 7) Students are not burdened by the requirements of fulfilling the entire curriculum access to class increases; 8) Learning material is focused on literacy and numeration; 9) Teachers improve capacity by following online learning

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training; 10) Learning material has a correlation with living efficiency.

The Important factor in the implementation of online learning that should be reviewed is the digital literacy skills of teachers. Teachers digital literacy is the ability or attitude of teachers to utilize information technology and digital media in learning to achieve educational goals. Teachers digital literacy can be measured through indicators of 1) being able to use the software needed to support learning; 2) being able to search for information using digital applications; 3) understanding the functioning of application systems and communicating in the digital world; 4) being skilled and accustomed to interacting using digital technology and application; 5) interpreting the use of technology, information, and communication (TIC) to support learning activities responsibly and ethically, and 6) being able to sort, analyze, and create through the use of technology and the interpretation of information.

This study refers to several previous relevant studies related to the implementation of online learning, including the results of the study (Suryadi, 2019) presented developments in information and communication technology that have a major influence on the world of education, in particular in the planning, process, and evaluation activities. Further (Ally, 2019) in her research submitted that teachers must be digital to use technology in conveying and supporting the education system, teachers need to develop digital learning resources to be accessible to learners using technology, and teachers with learners should use digital technology in facilitating learning. Then the research entitled Digital Literacy Competences for Teachers and Students in the School Environment of Malang District. The results of the research revealed that digital literacy competencies are necessary for students and teachers in the school environment so that the school community has a critical attitude in accessing information (Asari et al., 2019).

Previous research related to the implementation of online learning has not touched on the theoretical and statistical evidence regarding the influence of digital literacy among teachers on the improbability of online education implementation. What distinguishes this research from previous research is that this study uses digital literature variables as independent variables that can influence the variable of online learning implementation, and this study will review and reveal the influences of the digital literacy of teachers on online learning implementation in particular in the State High School of Education located in Gowa District. It suggests that this research is very important to do because no one has done it before, so with the presence of this intersection, it is expected to contribute as reference data, evaluation material, and a recommendation to the government of the field of education in developing learning practices and the professionalization of digital age teachers and treatments in the development of teacher competencies in the era of digital technology development at the Middle School of High Schools.

2. Method

This study used a survey method with a quantitative approach to achieve research objectives, which were carried out at all state high schools in Gowa District. The population in this study were all teachers with civil servant status, as many as 238 teachers, then in obtaining the number of samples using the Slovin formula so that a sample of 70 teachers was obtained and in obtaining the research sample using proportional random sampling technique.

The independent variable in this study is teacher digital literacy, and the dependent variable is the implementation of online learning. The data collection technique uses a Likert scale questionnaire; the content validity test uses the Gregory formula; the construct validity test uses the confirmatory factor analysis technique with the maximum likelihood approach; and the instrument reliability test uses the Cronbach alpha formula.

The data analysis technique to achieve the research objectives is to use a simple linear regression analysis technique with a regression equation model, namely $\hat{Y} = \beta_0 + \beta_1 X + \varepsilon$. The hypothesis in this study is that there is a positive and significant effect of teacher digital literacy on the implementation of online learning at State Vocational High Schools in Gowa Regency at the α (5%) level.

3. Results and Discussion

The validity test of the contents of the instruments was developed using the gregory formula with the attention of two expert opinions that then gave a score against 26 elements on each instrument for each variable in this study.

Table 1. The Results of Content Validity

Instrument	Number of Items	Internal Consistency Value
Teacher's Digital Literacy	26	1
Online Learning Implementation	26	1

Based on **Table 1**, it is obtained that by taking into account the opinions of two experts, the value of the internal coherence coefficient is 1 for teacher digital literacy instruments consisting of 26 elements and

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teacher performance instruments comprising 26 elements. By taking into consideration the values of internal consistency coefficients of both such instruments, which are worth 1 greater than 0.75, it can be stated that both of these instruments have qualified for the validity of content based on expert opinion.

The technique in testing the construct validity of each instrument in this study uses confirmatory factor analysis techniques with a maximum likehood approach with the Kaiser Meyer Olkin (KMO) and measure of sampling adequacy (MSA) criteria worth> 0.50. Bartlett's test obtained a sig.p value of 0.00 for further analysis, then the anti-image correlation value> 0.50 to be included in factor analysis, and the factor loading value ≥ 0.40 (Azwar, 2019) whose calculations used the help of the SPSS for windows program.

a. The Results of Construct Validity Instrument of The Teacher's Digital Literacy

As for the validity test results for the construction of digital literacy instruments are presented in **Table 2.**

Table 2. Analysis Prerequisite Test Results

Analysis of Prerequisite		Value
KMO-MSA		0,89
Bartlett's Test of Sphericity	Chi-Square	4714.86
	Df	253
	Sig.	0,00

Based on **Table 2**, the KMO-MSA value is 0.89 and sig. p 0.00, indicating that the sample sufficient value has been met in conducting factor analysis. Furthermore, the anti-image correlation value> 0.50 is obtained for 6 indicators with a distribution of 26 items, which will then be included in determining a factor with the maximum likelihood method, so that the factor matrix results are presented in **Table 3**.

Table 3. Factor Matrix Result

Item	Factor 1
I1.1	0,94
I1.2	0,86
I1.3	0,74
I2.4	0,73
I2.5	0,84
I2.6	0,83
I3.7	0,88
I3.9	0,63
I3.10	0,74
I3.11	0,94
I4.12	0,82
I4.13	0,58
I4.14	0,72
I4.15	0,88
I4.16	0,83
I5.17	0,84
I5.19	0,81

Item	Factor 1
I5.20	0,77
I5.21	0,95
I6.22	0,95
I6.23	0,96
I6.24	0,76
I6.25	0,80

Table 3 shows that there are 23 items of the previous 26 items of 6 indicators that have factor loading values ≥ 0.40, and there are 3 items, namely indicator 3 (item 8), indicator 5 (item 18), and indicator 6 (item 26), that refer to factor load values < 0.40. The remains of 23 grains were extracted and rotated again to see the conformity of the factor model with the goodness of fit test, so that a chi-square value of 1573,59 > the critical value (df = 230) of 266.37 and a significance value of 0.00 < α were obtained. (0,05). Based on the process, it was suggested that on the teacher's digital literacy instrument, there are 23 items that form a factor. The results of the analysis indicate that 23 valid items are present on 6 indicators as observed variables and have contributed significantly.

b. *The results of testing the construct validity of the online learning implementation instrument*

As for the validity test results of the construction of online learning implementation instruments presented in **Table 4.**

Table 4. Analysis Prerequisite Test Results

Analysis of Prerequisite		Value
KMO-MSA		0,86
Bartlett's Test of Sphericity	Chi-Square	5653,61
	Df	325
	Sig.	0,00

Based on **Table 4**, the KMO-MSA value is 0.86 and sig. p 0.00, indicating that the sample adequacy has been met in conducting factor analysis. Furthermore, the anti-image correlation value> 0.50 is obtained for 10 indicators with a distribution of 26 items, which will then be included in determining a factor with the maximum likelihood method, so that the factor matrix results are presented in **Table 5.**

Table 5. Factor Matrix Result

Items	Factor 1
I1.1	0,87
I1.2	0,81
I2.1	0,57
I2.2	0,63
I3.2	0,90
I4.1	0,67
I4.2	0,65
I4.3	0,43

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Items	Factor 1
I5.1	0,55
I6.1	0,89
I6.2	0,62
I7.1	0,93
I7.2	0,87
I7.3	0,85
I8.1	0,69
I8.2	0,65
I8.3	0,89
I9.2	0,76
I9.3	0,84
I10.1	0,84
I10.2	0,61
I10.3	0,81

The **Table 5** shows that there are 22 items from the previous 26 items from 10 indicators that have a factor loading value ≥ 0.40, and there are 4 items, namely in indicator 3 (item 5), indicator 5 (items 11 and 12), and indicator 9 (item 21), which indicate a factor loading value <0.40. Next, 22 items were extracted and rotated again to see the suitability of the factor model with goodness of fit tess so that the chi-square value was 3495.57> critical value (df = 299) of 265.37 and a significance value of $0.00 < \alpha$ (0.05). Based on this process, it is stated that in the online learning implementation instrument, there are 22 items that form a factor. The results of the analysis indicate that 22 valid items are found in 10 indicators as observed variables and have made a significant contribution.

c. The Results Of Validity Test Of Construction Instance Implementation Of Online Learning

The reliability test of each instrument in this study uses the Cronbach alpha formula with the criteria that an instrument is considered reliable when the rehab coefficient value is > 0.75. The tests were conducted with the help of the SPSS 20 program. As for the interpretation of the test results presented in **Table 6**.

Table 6. The Results of Reliability

Instruments	Value	Remarks
Teacher's Digital Literacy	0,97	Reliabel
Online Learning Implementation	0,97	Reliabel

Based on **Table 6**, it can be explained that each instrument in this study has met the reliability requirements, where the teacher digital literacy instrument has a reliability value of 0.97 and the online learning implementation instrument has a reliability value of 0.97.

To determine the effect of teacher's digital literacy on the implementation of online learning, data processing and analysis are carried out using simple linear regression analysis techniques using data obtained from respondents, of which as many as 70 teachers are samples in this study. In analysing the data of this study using the help of the SPSS 20 program, the results of simple linear regression analysis are presented in Table 7 below.

Table 7. Regression Analysis Results

Model	Unstand. Coeff.	T	Sig
Constanta	0,97	4,67	0,00
Teacher's digital literacy	0,97	7,92	0,00

Based on **Table 7**, it is obtained that the regression equation model formed in this study is where $\beta 0$ is worth 27.10 and the regression coefficient $\beta 1$ is worth 0.60 so that the regression equation model formed is $\hat{Y} = 27.10 + 0.60$. Based on the regression equation model formed, it can be interpreted and predicted that the implementation of online learning is expected to increase by 0.60 for each increase in teacher's digital literacy by one score. Furthermore, by paying attention to the regression equation model that shows a positive value and through the significance test, the sig. p value is $0.00 < \alpha$ (0.05) or the t value (7.92) > t table (1.66) so that based on these calculations and tests, Ho is rejected and H1 is accepted. So that based on the interpretation of the results of calculations and tests carried out, it can be concluded that there is a positive and significant effect of teacher digital literacy on the implementation of online learning at State Vocational High Schools in Gowa Regency.

Then to find out the contribution or influence of teacher's digital literacy on the implementation of online learning can be seen in the presentation of Table 8.

Table 8. Coefficient Result

Model	R	R Square
1	0,69	0,48

Based on Table 8, the coefficient of determination $R2$ is 0.48 or 48%, which explains that 48% of teacher's digital literacy affects the implementation of online learning and 52% can be influenced by other factors outside this study. Furthermore, it can also be explained that 48% of the variance that occurs in the implementation of online learning (Y) is explained by teacher's digital literacy (X).

Based on the results of the analysis and testing that has been carried out in this study, it can be stated that there is a positive and significant effect of teacher digital literacy on the implementation of online learning. In connection with the positive and significant regression coefficient, it is suggested that the role of teacher digital

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literacy is real in the implementation of online learning at State High Schools in Gowa Regency. This role can also mean that the better the teacher's digital literacy, the more and better the implementation of online learning.

The realization of quality education cannot be separated from the role of a teacher who continues to strive to provide learning that can be easily understood by students, including in learning and teaching activities in a Covid 19 pandemic situation, where the government through the Ministry of Education and Culture issued a policy for learning and teaching activities carried out online or distance education.

The findings in this study reveal that there is a positive and significant effect of teacher digital literacy on the implementation of online learning, this is in line with the results of research conducted by (Hossein et al., 2021) which shows that the quality of online learning is determined by the role of teacher professionalism including in the aspect of ability to use technology. Then (Aliyyah et al., 2020) stated that one of the important aspects that support the successful implementation of online teaching and learning is the digital literacy competence possessed by teachers and (Guinnes & Fulton, 2019) in their research stated that digital literacy ability an important role in supporting the success of online learning.

In addition, every teacher needs to understand that digital literacy is essential and needed in the learning process at this time (Zahorec et al., 2019) and being digitally literate will create an order of teachers with a critical, creative and innovative mindset (Taskıran & Salur, 2021). The success of forming digital literacy capabilities for teachers is one of the indicators of achievement in the field of education, this is also in line with the terminology developed by Unesco, namely the concept of digital literacy which is related to the world of education and is a life skill that involves the ability to use information technology devices in learning (Kemdikbud, 2017).

Digital literacy will not provide a significant effect if teachers do not have the skills to use digital media in learning, because this has been stated by (Peechapol et al., 2018) which explains that online learning is a learning method that uses information technology, and (Cetin, 2021) suggests that digital literacy is the ability to understand and use information technology in various forms from a very wide range of sources.

4. Conclusion

Based on the research that has been conducted, it can be concluded that there is a positive and significant effect of teacher's digital literacy on the implementation of online learning at State High Schools in Gowa Regency. The amount of influence or contribution of teacher digital literacy on the implementation of online learning is 48%, therefore it can be suggested that teacher's digital literacy has an important and aligned role in the implementation of online learning. This role can mean that the better the teacher's digital literacy, the more it will support the successful implementation of online learning carried out by teachers in achieving educational goals.

References

Alghamdi, A. K. H., & Al-Ghamdi, N. A. (2021). Elementary teachers' thoughts about distance education and learning 21st-century skills during covid pandemic. International Journal of Learning, Teaching and Educational Research, 20(3), 33–50. https://doi.org/10.26803/ijlter.20.3.3

Aliyyah, R. R., Reza, R., & Achmad, S. (2020). The Perceptions of Primary School Teachers of Online Learning during the COVID-19 Pandemic Period : A Case Study in Indonesia. Journal of Ethnic and Cultural Studies, 7(2), 90–109. https://doi.org/http://dx.doi.org/10.29333/ejecs/388

Ally, M. (2019). International Review of Research in Open and Distributed Learning Competency Profile of the Digital and Online Teacher in Future Education. International Review of Research in Open and Distributed Learning Competency, 20(2), 303–318. Diambil dari https://id.erudit.org/iderudit/1061343ar

Arifianto, C. F., Mutawali, & Subekti, H. (2021). The Teachers' Online Readiness: an evaluation of Online Learning during Covid-19 Pandemic in Indonesia. International Journal of Social Learning (IJSL), 1(3), 270–282. https://doi.org/10.47134/ijsl.v1i3.63

Asari, A., Kurniawan, T., Ansor, S., Bagus, A., & Rahma, N. (2019). Kompetensi Literasi Digital Bagi Guru Dan Pelajar Dilingkungan Sekolah Kabupaten Malang. BIBLIOTIKA: Jurnal Kajian Perpustakaan dan Informasi, 3(2), 98–104.

Azwar, S. (2019). Reliabilitas dan Validitas. Yogyakarta: Pustaka Pelajar.

Cetin, E. (2021). Digital storytelling in teacher education and its effect on the digital literacy of pre-service teachers. Thinking Skills and Creativity, 39, 100760. https://doi.org/10.1016/j.tsc.2020.100760

Cruzado, C., & Santiago, R. (2021). Teacher digital literacy: The indisputable challenge after covid-19. Sustainability (Switzerland), 13(4), 1–29. https://doi.org/10.3390/su13041858

Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. Journal of Educational Technology Systems, 49(1), 5–22. https://doi.org/10.1177/0047239520934018

Febrianto, P. T., Mas'udah, S., & Megasari, L. A. (2020). Implementation of online learning during the covid-19 pandemic on Madura Island, Indonesia. International Journal of Learning, Teaching and Educational Research, 19(8), 233–254. https://doi.org/10.26803/ijlter.19.8.13

Guinnes, C., & Fulton, C. (2019). Digital Literacy In Higher Education: A Case Study Of Student Engagement With E-Tutorials Using Blended Learning. Journal of information technology education: Innovations in practice, 18(4), 477–551. https://doi.org/10.28945/4190

Gurevich, I., Stein, H., & Gorev, D. (2017). Tracking Professional Development of Novice Teachers when Integrating Technology in Teaching Mathematics. Computers in the Schools, 34(4), 267–283. https://doi.org/10.1080/07380569.2017.1387470

Hasse, C. (2017). Technological literacy for teachers. Oxford Review of Education, 43(3), 365–378. https://doi.org/10.1080/03054985.2017.1305057

Hossein-Mohand, H., Trujillo-Torres, J. M., Gómez-García, M., Hossein-Mohand, H., & Campos-Soto, A. (2021). Analysis of the use and integration of the flipped learning model, project-based learning, and gamification methodologies by secondary school mathematics teachers. Sustainability (Switzerland), 13(5), 1–18. https://doi.org/10.3390/su13052606

Kemdikbud. (2017). Konsep Literasi Digital dalam Kurikulum 2013. Jakarta: Pusat Kurikulum dan Perbukuan Kemdikbud.

Kemdikbud. (2020). Analisis survei cepat pembelajaran dari rumah dalam masa pencegahan covid-19. Jakarta: Kemterian Pendidikan dan Kebudayaan.

Koivuniemi, M., Järvenoja, H., & Järvelä, S. (2018). Teacher education students' strategic activities in challenging collaborative learning situations. Learning, Culture and Social Interaction, 19, 109–123. https://doi.org/10.1016/j.lcsi.2018.05.002

Mameli, C., Grazia, V., & Molinari, L. (2020). Agency, responsibility and equity in teacher versus student-centred school activities: A comparison between teachers' and learners' perceptions. Journal of Educational Change, 21(2), 345–361. https://doi.org/10.1007/s10833-019-09366-y

Nabhan, S. (2021). Pre-service teachers' conceptions and competences on digital literacy in an EFL academic writing setting. Indonesian Journal of Applied Linguistics, 11(1), 187–199. https://doi.org/10.17509/ijal.v11i1.34628

Ngabiyanto, Nurkhin, A., Mukhibad, H., & Harsono. (2021). E-learning evaluation using general extended technology acceptance model approach at schools in COVID-19 pandemic. European Journal of Educational Research, 10(3), 1171–1180. https://doi.org/10.12973/EU-JER.10.3.1171

Peechapol, C., Na-Songkhla, J., Sujiva, S., & Luangsodsai, A. (2018). An exploration of factors influencing self-efficacy in online learning: A systematic review. International Journal of Emerging Technologies in Learning, 13(9), 64–86. https://doi.org/10.3991/ijet.v13i09.8351

Pongsakdi, N., Kortelainen, A., & Veermans, M. (2021). The impact of digital pedagogy training on in-service teachers' attitudes towards digital technologies. Education and Information Technologies, 26(5), 5041–5054. https://doi.org/10.1007/s10639-021-10439-w

Suryadi, S. (2019). Peranan Perkembangan Teknologi Informasi Dan Komunikasi Dalam Kegiatan Pembelajaran Dan Perkembangan Dunia Pendidikan. Jurnal Informatika, 3(3), 9–19. https://doi.org/10.36987/informatika.v3i3.219

Taskıran, C., & Salur, M. (2021). Analysis of the Opinions of Social Studies Teachers on Digital Literacy Skills. World Journal of Education, 11(2), 72–84. https://doi.org/10.5430/wje.v11n2p72

Zahorec, J., Hašková, A., & Munk, M. (2019). Teachers' professional digital literacy skills and their upgrade. European Journal of Contemporary Education, 8(2), 378–393. https://doi.org/10.13187/ejced.2019.2.378