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The Effect of E-learning and Students' Digital Literacy towards Their Learning Outcomes

Gede Arka Puniatmaja[1], Ni Nyoman Parwati[2], I Made Tegeh[3], I Gde W. Sudatha[4]
[1-3]Universitas Pendidikan Ganesha

Abstract

The present study aimed at examining the effect of e-learning and students 'digital literacy towards their learning outcomes. It was designed in quasi-experimental research with post-test-only control group within 2x2 factorial design. The sample of the study involved 96 vocational students obtained from random sampling technique. Two instruments were conducted in this study, namely questionnaire and test. The obtained data were analysed descriptively and inferentially assisted by SPSS 25 in which analysis variance test (ANOVA) was conducted for hypothesis testing. The results of the study show 1) there are different learning outcomes between students who were taught using e-learning and conventional method; 2) there is an interactional effect between e-learning and students' digital literacy; 3) there are different learning outcomes between students with high digital literacy of experimental and high control group; and 4) there are different learning outcomes between students with low digital literacy of experimental and high control group. The provision of e-learning is effective for learning process. It implicates the teachers in which they direct students to know any digital learning platforms. It gives chance to integrate learning and technology to make students familiar with various technology which gives impact to their learning outcomes.

Keywords: digital literacy; e-learning; learning outcomes

Introduction

Achieving optimal learning outcome is an indication towards the learning and teaching process conducted in educational institutions. It reflects the concerted efforts from all academic organizational stake-holders in improving the education quality to produce a better and competent human resource in this globalization era (Farhan et al., 2019). A great discussion and interaction are conducted both teachers and students shown on how the learning outcome achieved by the students (Lukitasari et al., 2020). The higher learning outcome gained by the students, then the learning and teaching process is considered to be more effective (Astra et al., 2015). It is even argued that learning outcomes are perceived as a basic assumption in determining whether the learning and teaching process has been running effectively and efficiently (Ananda, 2019). Therefore, learning outcome becomes inseparable aspect obtained to assess the education quality.

Learning outcome is commonly defined as a result of learning interaction conducted during the learning process. It is commonly believed that learning outcome is students' academic achievement covering their understandings and practical skills (Wijaya et al., 2018) . It is limited on students' cognition related to how they solve the problem in verbal an non-verbal forms, connect their knowledge and real case, implement the concept and principle that they learn, and apply their creativities during the learning process (Kembuan & Daud, 2019). It is added that learning outcome is generally used to measure the students' learning progress in which it is observed through behavioural change done by the students (Prasetyo et al., 2021). The behavioural change is referred to the three learning aspects such as; cognitive, psychomotor, and affective represented as students' competences (Kumar, 2016; Munir et al., 2022; Rahayu & Iswari, 2021; Sembiring et al., 2021). Most of people recognize learning outcome as a sensitive learning element considering that it can be effortlessly influenced by many factors including the external and internal factors (Utami, 2016). The high and low of students' learning outcomes depend on the learning environment as the external factor and students themselves as the internal factor (Puspitasari et al., 2022; Puspitasari, 2018; Wei et al., 2023). It indicates that learning outcome is a part of educational measurement which can be significantly influenced by several factors.

Since learning outcome is perceived as a sensitive part used for determining the success of learning process, it is undeniable that an issue related to learning outcome

Corresponding Author e-mail: arka@undiksha.ac.id,
https://orcid.org/0009-0003-6380-0726

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becoming a concern in educational research. A recent issue about learning outcomes appears due to learning shifting during and after Covid-19 pandemic (Baber, 2020). The transmission from traditional classrooms into hybrid learning which integrates technology as a learning process to facilitates students' distant and direct learning emerges a condition where students face a difficulty (Baber, 2020; Orlov et al., 2021; Rashid & Yadav, 2020). They face a difficulty in adapting themselves to interact with teacher and other students in which it influences their learning outcomes. It is stated that low learning outcomes becoming a serious problem due to ineffective learning interaction during the learning process (Hamzah et al., 2022). Therefore, having low learning outcome still becomes a major problem particularly in this transition era due to Covid-19 pandemic (Rahayu et al., 2020). A relevant problem is found related to the issue of low students' learning outcome particularly in vocational school. The 11th grade students who join information system design of human and computer interaction course at SMK Telkom Malang as one of vocational school which conducts hybrid learning after Covid-19 pandemic tends to have low learning outcomes. The problem occurs due to unoptimized learning interaction through hybrid learning in which it becomes a serious challenge.

Oppositely, hybrid learning is taken by the government and institutional stake-holders as an alternative way to optimize the learning process during and after Covid-19 pandemic. It is a learning process combining face to face and online learning to optimize students' learning experience (Li et al., 2021; Raes et al., 2020). Students are allowed to have direct interaction through face-to-face learning meanwhile they are provided with unlimited space and time to learn and explore their self-autonomy (Jamison et al., 2014; Sukiman et al., 2022). Hybrid learning or also known as blended learning offers an opportunity to conduct an interactive and engaging learning process by allowing teachers to conduct students-centred learning activity (Mohammadyari & Singh, 2015; Singh & Meena, 2022; Singh et al., 2021). It is added that the main element of hybrid learning is online learning not adapted as a substitute of conventional classroom but it is used for building and exploring the concept has been discussed in the classroom. Implementing hybrid learning increases students and teachers interaction in the learning process since students are allowed to have interaction out of classroom through online learning (Badrus & Arifin, 2021). The increasement of learning interaction has an essential effects towards students' learning outcome since learning outcome depend on the interaction occurs in the learning and teaching process (Peng & Fu, 2021). The interactive and engaging learning process offered through online and offline environment provided in hybrid learning is appropriate for the condition during and after covid-19 pandemic where students are able to have direct learning interaction and technological learning experience.

However, a successful hybrid learning cannot be separated from the term of e-learning in which it becomes a component that supports and optimizes the learning interaction conducted by students and teachers. It is suggested that hybrid learning is supposed to be conducted by considering students' needs, learning strategies, and the media used as the supporting component (Islam et al., 2022). E-learning is the referred to a supporting component which connects the students and teachers in online learning process designed for covering the limitation owned between teachers and students during the conventional learning (Bali et al., 2022). E-learning is viewed as a learning management system (LMS) used for a learning media providing students with information accessibility, content delivery, personalized instruction, and accountability (Bismala & Manurung, 2021). Using e-learning as a web-based media course is a trend in education system to present various learning contents (Kacetl & Semradova, 2020; Munir et al., 2022; Munro et al., 2018). A wide access of selecting various learning sources provided in e-learning covers the limitation found during face-to-face learning (Kristanto et al., 2017). It means that e-learning assisting the implementation of hybrid learning allowing students' design their own learning process without decreasing their learning interaction instead improving their learning experience with unlimited space, time, and sources (Latip et al., 2020; Nikou & Maslov, 2023; Puriwat & Tripopsakul, 2021).

The assistance of e-learning in optimizing the implementation of hybrid learning also depends its users. The information and multiple advantages provided by e-learning cannot be achieved maximally to strengthen the connectivity between students and teachers in conventional learning if the individual initiative and ability are not well prepared (Latip et al., 2022). Ensuring that students' have a high commitment and knowledge encountered with technology is a basic pose in conducting a learning process integrated with technology (Kintu et al., 2017; Mihailidis, 2015; Mugenyi & Chang, 2016). The ability of collaborating with technology to control the learning process is required by the students since they are becoming the main users in adopting e-learning (Erarslan & Topkaya, 2017; Mohammadyari & Singh, 2015). Students' ability and knowledge towards the use of technology needs to be questioned in integrating e-learning into the hybrid learning process since not all the native digitals are familiar with the use of technology for educational purpose (Jamal & Imran, 2018).

Digital literacy is one of technological competences required to be owned by students for incorporating e-learning in hybrid learning. It is also stated that digital literacy is a fundamental understanding of technology perceived as a set of necessary competences for integrating e-learning into education system (Dewi, 2022; Hamutoglu et al., 2019). It is recognized as a qualification for the students in all degrees related on how

they function and use technology to connect their learning process and specific areas to achieve their professional goals (Hall et al., 2013). It reflects that digital literacy is a key role in using e-learning for optimizing hybrid learning since it is viewed as the ability in utilizing technological means or digital devices effectively and efficiently to find and deliver information (Tang & Chaw, 2016). Therefore, students' digital literacy is the main question that needs to be concerned by the teacher related to the assistance or effectiveness of e-learning as a media for conducting hybrid learning (Nammakhunt et al., 2023; Yang et al., 2014).

Inseparable connection between e-learning and digital literacy to improve the interaction between students and teachers during hybrid learning process in order to increase students' learning outcomes becoming a great dealt to be researched. Many researchers have been long focused on discussing digital literacy and e-learning related to hybrid learning implementation during and after Covid-19. It reveals that digital literacy receives positive attitudes from vocational students related to the implementation of hybrid learning as innovative learning method during Covid-19 outbreak (Rahmaniah, 2022). It is relevant to the finding which shows that the score of students have been increased (Liu, 2021). In addition, Sumin et al. (2021) found out that digital literacy variable gives significant positive effect on the use of e-learning. Moreover, Pratama et al. (2019) and Arfadila et al. (2022) found out that e-learning can train students' digital literacy and independence.

Further research needs to be conducted to show deeper understanding related to issue of low learning outcomes during the implementation of hybrid learning in post-pandemic era. This study is conducted considering that some previous studies have revealed that e-learning and digital literacy having a crucial impact in the learning process. It focuses on the problem found at SMK Telkom Malang related to the low learning outcomes achieved by 11th grade students who join information system design of human and computer interaction course through hybrid learning. There is no recent study which furtherly discuss on how e-learning and students' digital literacy affects vocational students' learning outcomes in information system design of human and computer interaction course. Therefore, this study is conducted to investigate the effect of e-learning and students' digital literacy towards students' information system learning outcomes.

Research Questions

Considering the explanation above, there are four questions formulated in thus study, as follows.

1. Is there any difference between students who are taught using e-learning and students who are taught using conventional method?
2. Is there any interactional effect between e-learning and digital literacy?
3. Is there any difference in learning outcomes between students with high digital literacy who are taught by using e-learning and students who are taught by using conventional method?
4. Is there any difference in learning outcomes between students with low digital literacy who are taught by using e-learning and students who are taught by using conventional method?

Method

Research Design

The present study was designed into post-test only control group Quasi Experimental with 2x2 factorial model. This study concerned on investigating three research variables; e-learning as independent variable, students' digital literacy as moderator variable, and students' learning outcomes as dependent variable.

Samples

The study was conducted at SMK Telkom Malang as one of the vocational schools in East Java, Indonesia. The research population was 384 eleventh grade students in which there were only 96 eleventh grade students selected as the research sample. They were the students who took information system design of human and computer interaction course. The samples of this study were selected by conducting randomly sampling technique. Then, the samples obtained the test to know the level of their digital literacy. After that, the samples were divided into four groups; 1) control group with high digital literacy, 2) control group with low digital literacy, 3) experimental group with high digital literacy, and 4) experimental group with low digital literacy. There was a different condition experience between the experimental and control group. In the control group, the students were given the conventional method. The students only learn face-to-face with their teacher during online learning. On the other side, in the experimental group, the students were given e-learning during the learning process.

Instruments

The present study employed two instruments to obtain the data, namely questionnaire and performance test. Questionnaires were conducted to measure their level of digital literacy. The results of the questionnaire indicated high or low their digital literacy. Besides, test was conducted to measure students' outcomes by conducting practicum in the classroom. In addition, content validity of the instruments was examined by two experts. It was done by using Gregory's formula to get valid data from the samples of the study.

Data Analysis

The results of post-test were analyzed descriptively and inferentially with the assistance SPSS 25. Descriptive statistic was used to analyzed the data descriptively meanwhile inferential analysis was conducted through analysis variance test (ANOVA). Perquisite testing was also conducted to examine the normality and homogeneity of the data.

Hypothesis

Then, hypothesis testing was done covering four hypotheses of the study, namely 1) there were different learning outcomes between students who were taught using e-learning and conventional method; 2) there was an interactional effect between e-learning and students' digital literacy; 3) there were different learning outcomes between students with high digital literacy of experimental and high control group; and 4) there were different learning outcomes between students with low digital literacy of experimental and high control group.

Results

The obtained data were analysed descriptively in order to see the characteristics of data covering number of samples (N), mean, standard deviation, minimum score, and maximum score as presented in Table 1 as follows.

Table 1 shows descriptive statistic of each group consisting 24 students. Students with high digital literacy in the experimental group obtained mean about 84.04 with 3.895 standard deviation, minimum score of 75 and maximum score of 90. Then, students with low digital literacy in experimental group obtained mean about 73.71 with 4.648 standard deviation, minimum score of 65 and maximum score of 85. Next, students with high digital literacy in the control group obtained mean about 77.25 with 4.693 standard deviation, minimum score of 68 and maximum score of 88. Lastly, students with low digital literacy in the control group obtained mean about 78.42 with 4.096 standard deviation, minimum score of 70 and maximum score of 85. The descriptive statistic shows different learning outcomes between experimental and control group.

Furthermore, in order to prove the hypothesis of the study, inferential statistic was conducted. Firstly, it was done by conducting prerequisite tests, namely normality and homogeneity as presented in Table 2 and 3 as follows.

Table 2 shows that the samples of the present study were less than 50, so the sig. value of Shapiro-Wilk was identified.

Table 1 Descriptive Statistics

Groups	*N*	*Mean*	*Std. Deviation*	*Minimum score*	*Maximum score*
High Experimental	24	84.04	3.895	75	90
Low Experimental	24	73.71	4.648	65	85
High Control	24	77.25	4.693	68	88
Low Control	24	78.42	4.096	70	85
Total	96	78.35	5.677	65	90

Table 2: Tests of normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Score	High Experimental	.153	24	.153	.925	24	.074
	Low Experimental	.182	24	.038	.941	24	.169
	High Control	.188	24	.027	.946	24	.217
	Low Control	.168	24	.079	.931	24	.104

a. Lilliefors Significance Correction

Table 3: Test of homogeneity of variance

		Levene Statistic	*df1*	*df2*	*Sig.*
Score	Based on Mean	.178	3	92	.911
	Based on Median	.099	3	92	.961
	Based on Median and with adjusted df	.099	3	88.634	.961
	Based on trimmed mean	.168	3	92	.918

The sig. value of the high experimental group (0.074), low experimental group (0.169), high control group (0.217), and low control group (0.104) were higher than 0.050 indicating that the data were normally distributed.

Table 3 shows the result of the homogeneity test. The Sig. value of the mean was 0.911 which was higher than 0.05 indicating that the data were homogenous.

Table 2 and 3 show that the data were normal and homogeneous. Then, inferential analysis was conducted to examine the difference between the experimental and control group as presented in the following explanation.

Different Effect between the Experimental and Control Group

The result of different effect between the experimental and control group was in Table 4.

Table 4 shows the results of One-way ANOVA test. It shows the Sig. value was 0.000 which was smaller than 0.050. It indicates that there is a significantly different effect on students' learning outcomes between students who were taught by using e-learning and those who were taught by using a conventional method.

Interactional Effect between E-learning and Students' Digital Literacy

The result of the interactional effect between e-learning and students' digital literacy was presented in the following Table 5.

Table 5 shows the result of the interactional effect between e-learning and students' digital literacy. The Sig. value of the interactional effect was 0.000 which was lower than 0.050. It indicates that digital literacy and e-learning significantly influence on students' learning outcomes. There is different learning outcome between students who are taught using e-learning and students who are taught using a conventional method.

Different Learning Outcomes Between Students with High Digital Literacy Taught by E-Learning and Students Taught by Conventional Method

The result of learning outcomes of students with high digital literacy who are taught by e-learning and conventional method can be seen in Table 6 as follows.Table 6 shows the difference in learning outcomes between students with high digital literacy taught by e-learning and students taught by the conventional method. The Sig. value was 0.000 which was lower than 0.050. It indicates that there is a significant difference between students with high digital literacy who are taught by e-learning and conventional method. Students with high digital literacy who were taught by e-learning outperformed students who were taught by conventional method. The learning outcomes of students who joined the e-learning (84.04) are better than students who joined the conventional method (78.25) (see Table 3).

Table 7 shows the difference in learning outcomes between students with low digital literacy taught by e-learning and students taught by the conventional method. The Sig. value

Table 4: *Anova*

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Between Groups	1323.708	3	441.236	23.353	.000
Within Groups	1738.250	92	18.894		
Total	3061.958	95			

Table 5: Interactional Effect

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*
Corrected Model	1323.708a	3	441.236	23.353	.000	.432
Intercept	589380.042	1	589380.042	31193.996	.000	.997
Digital Literacy	504.167	1	504.167	26.684	.000	.225
E-Learning	26.042	1	26.042	1.378	.243	.015
Digital Literacy* E-Learning	793.500	1	793.500	41.997	.000	.313
Error	1738.250	92	18.894			
Total	592442.000	96				
Corrected Total	3061.958	95				

a. R Squared = .432 (Adjusted R Squared = .414)

Table 6: Difference in learning outcomes between students with high digital literacy taught by e-learning and students taught by the conventional method

Scheffe						
		Mean Difference (I-J)			*95% Confidence Interval*	
(I) Group	*(J) Group*		*Std. Error*	*Sig.*	*Lower Bound*	*Upper Bound*
High Experimental	High Control	6.792*	1.255	.000	3.22	10.37

. The mean difference is significant at the 0.05 level.

Table 7: *Difference in learning outcomes between students with low digital literacy taught by e-learning and students taught by the conventional method*

Scheffe						
		Mean Difference (I-J)			*95% Confidence Interval*	
(I) Group	*(J) Group*		*Std. Error*	*Sig.*	*Lower Bound*	*Upper Bound*
High Experimental	High Control	4.708*	1.255	.004	1.13	8.28

*. The mean difference is significant at the 0.05 level.

was 0.004 which was lower than 0.050. It indicates that there is a significant difference between students with low digital literacy who are taught by e-learning and conventional method. Students with low digital literacy who were taught by the conventional method outperformed students who were taught by e-learning. The learning outcomes of students who joined conventional method (77.25) are better than students who joined the e-learning (73.71) (see Table 1).

Discussions

The use of e-learning is an alternative way to support the hybrid learning which can optimize students' learning experience (Li et al., 2021; Raes et al., 2020). Students can experience online and offline learning. In addition, through hybrid learning students are provided with unlimited space and time to learn and explore their self-autonomy (Jamison et al., 2014; Sukiman et al., 2022). Students may access the learning content anytime in which they can manage themselves to learn with their own style. Moreover, hybrid learning promotes students-centered learning (Mohammadyari & Singh, 2015; Robroo, 2019; Singh & Meena, 2022; Singh et al., 2021). Students are provided with interactive learning in which students need to engage themselves to finish their tasks. Therefore, hybrid learning can be an alternative choice for students to create interactive learning with the provision of learning technology or learning management system.

The present study finds out that students who are taught by using e-learning outperform students who are taught by conventional method. It can be seen that e-learning can increase the results as an improvement from what students learn (Alenezi, 2020). It is due to the provision of online learning supported by e-learning. E-learning is usually designed for educational purposes (Erragcha & Babay, 2023). It is used to ease the online process of teaching and learning. Besides, e-learning provides connection between students and teachers in online learning to cover limitation during the conventional learning (Bali et al., 2022) (Latip et al., 2022). It indicates that students can still learn when they are out of the classroom. They still have access learning sources to be learnt. E-learning shows ease of use in which it provides students with information accessibility, content delivery, personalized instruction, and accountability (Bismala & Manurung, 2021). Students can learn from it independently without waiting direction from teacher.

The present study shows that there is an interactional effect between e-learning and digital literacy. It shows that digital literacy is one of technological competences required to be owned by students for incorporating e-learning in hybrid learning. It is also stated that digital literacy is a fundamental understanding of technology perceived as a set of necessary competences for integrating e-learning into education system (Dewi, 2022; Hamutoglu et al., 2019). It indicates that digital literacy becomes the factor influencing the use of e-learning. Besides, digital literacy is a competence to use technology or digital devices effectively and efficiently to find and deliver information (Tang & Chaw, 2016). It indicates that digital literacy becomes they key role in using e-learning for the learning process. Furthermore, the connection between

e-learning and digital literacy can be seen during Covid-19 outbreak (Basir et al., 2021). E-learning becomes connection for students and teachers to conduct learning. In addition, students' digital literacy supports the use of e-learning (Khan et al., 2022). Thus, it can be seen that e-learning and digital literacy are inseparable.

Students with the high digital literacy will obtain benefits for students to deal with online risk (Purnama et al., 2021). They can handle the problem about using the technology. In addition, high digital literacy leads students present new forms of information and solve problems (Kaeophanuek et al., 2018). It directs students to use different technology to create new form of information. Digital literacy covers active participation in a technological-based society (Tai et al., 2017). Moreover, high digital literacy will lead students to comprehend and utilize information presented in the computer (Atmanegara, 2019; Harmoko, 2021; Yashalova et al., 2019). Students do not only know how to operate computer but also understand the information inserted in the computer. High level of digital literacy directs students to get right and appropriate information (Perdana et al., 2019). They can select important information for the learning process. Therefore, it can be said that high digital literacy guides students to understand what they get and know how to operate the technology.

On the other side, low digital literacy causes students to have low self-control that can lead to deviations in the cyber-world (Purnama et al., 2021). Since students do not understand the information, they may share information others without deep consideration. In addition, low digital literacy makes students do not understand what is stated in the computer (Harmoko, 2021). They need help from the teachers to guide them. Moreover, students cannot handle the problem about using the technology (Kaeophanuek et al., 2018). Students cannot handle it independently. They need assistance from their friends or teachers. Therefore, having low digital literacy cannot guide students to be independent learners and need assistance in operating the technology.

Conclusion

The present study has viewed that both e-learning and digital literacy cannot be separated from each other. Digital literacy supports the operation of using e-learning. On the other side, e-learning is the medium to use digital literacy. The use of e-learning and existence of digital literacy for conducting online learning is important in the 21st century learning in which students and teacher can be connected virtually. This condition maximizes students' learning experience and leads them to be more active and enthusiastic. The results of the present study strengthen the existent of e-learning and its relevance with students' digital literacy in which both of those aspects can be used as an indicator of achieving a successful technology-based learning. It implicates to the teachers in which teachers need to give insight about the use of any digital platforms to strengthen their digital literacy. It can be beneficial since students are familiar with any digital platform which may be used by the teacher in the learning process. It is suggested for the teachers to give experience for the students in using technology and learning platform which can increase students' digital literacy.

References

Alenezi, A. (2020). The role of e-learning materials in enhancing teaching and learning behaviors. International Journal of Information and Education Technology, 10(1), 48–56. https://doi.org/10.18178/ijiet.2020.10.1.1338

Ananda, R. (2019). The Effect of Learning Strategies and Learning Independence on Learning Outcomes in Learning Evaluation Subject. IJLRES-International Journal on Language, Research, and Education Studies, 3(3), 340–350. https://doi.org/10.30575/2017/IJLRES-2019091201

Arfadila, A., Aulia, E. R. N., Nugraha, R. W., & Humaeroh, S. (2022). Penerapan e-learning dalam inovasi pendidikan untuk meningkatkan kemampuan literasi digital siswa. Jurnal Pendidikan Sosiologi Dan Humaniora, 13(2), 392. https://doi.org/10.26418/j-psh.v13i2.54771

Astra, I. M., Wahyuni, C., & Nasbey, H. (2015). Improvement of Learning Process and Learning Outcomes in Physics Learning by using Collaborative Learning Model of Group Investigation at High School (grade X, SMAN 14 Jakarta). Journal of Education and Practice, 6(11), 75–80.

Atmanegara, Y. (2019). Building Students' Digital Literacy Skill through Weblog - Library Center Approach. Didascein Bahasa, 4(2), 21–32.

Baber, H. (2020). Determinants of students' perceived learning outcome and satisfaction in online learning during the pandemic of covid-19. Journal of Education and E-Learning Research, 7(3), 285–292. https://doi.org/10.20448/journal.509.2020.73.285.292

Badrus, B., & Arifin, Z. (2021). The Effect of The Blended Learning Model on The Improvement of Student Learning Outcomes. Nazhruna: Jurnal Pendidikan Islam, 4(1), 108–116. https://doi.org/10.31538/nzh.v4i1.836

Bali, M. M. E. I., Aliyah, Z., & Humaidi, D. (2022). Effectiveness of Hybrid Learning Assisted in e-Learning Media in Mathematics Learning at Elementary School. Journal of Innovation in Educational and Cultural Research, 3(4), 683–690. https://doi.org/10.46843/jiecr.v3i4.340

Basir, A., Kamaliah, K., Harahap, A., Fauzi, A., & Karyanto, B. (2021). How Universities Entrust Digital Literacy to Improve Student Learning Outcomes During the COVID-19 Disruption. Jurnal Iqra' : Kajian Ilmu Pendidikan, 6(1), 235–246. https://doi.org/10.25217/ji.v6i1.1146

Bismala, L., & Manurung, Y. H. (2021). Student satisfaction in e-learning along the covid-19 pandemic with importance performance analysis. International Journal of Evaluation and Research in Education, 10(3), 753–759. https://doi.org/10.11591/ijere.v10i3.21467

Dewi, C. (2022). Digital literacy analysis of elementary school students through implementation of e-learning based learning management system. Journal of Education Technology, 6(2), 199–206.

Erarslan, A., & Topkaya, E. Z. (2017). EFL Students' Attitudes Towards e-Learning And Effect of An Online Course on Students' Success in English. The Literacy Trek, 3(2), 80–101.

Erragcha, N., & Babay, H. (2023). Perceived quality and satisfaction with e-Learning during COVID-19: Moderating role of co-production. International Journal of Information and Education Technology, 13(1), 64–72. https://doi.org/10.18178/ijiet.2023.13.1.1781

Farhan, W., Razmak, J., Demers, S., & Laflamme, S. (2019). E-learning systems versus instructional communication tools: Developing and testing a new e-learning user interface from the perspectives of teachers and students. Technology in Society, 59(February). https://doi.org/10.1016/j.techsoc.2019.101192

Hall, M., Nix, I., & Baker, K. (2013). Student experiences and perceptions of digital literacy skills development : engaging learners by design? The Electronic Journal of E-Learning, 11(3), 207–225.

Hamutoglu, N. B., Savasci, M., & Sezen-Gultekin, G. (2019). Digital literacy skills and attitudes towards e-learning. Journal of Education and Future, 3(16), 93–107.

Hamzah, Tambak, S., Hamzah, M. L., Purwati, A. A., Irawan, Y., & Umam, M. I. H. (2022). Effectiveness of Blended Learning Model Based on Problem-Based Learning in Islamic Studies Course. International Journal of Instruction, 15(2), 775–792. https://doi.org/10.29333/iji.2022.15242a

Harmoko, D. D. (2021). Digital Literacy As A Solution To Improve The Quality Of Indonesia's Human Resources. Research and Development Journal of Education, 7(2), 413. https://doi.org/10.30998/rdje.v7i2.10569

Islam, M. K., Sarker, M. F. H., & Islam, M. S. (2022). Promoting student-centred blended learning in higher education: A model. E-Learning and Digital Media, 19(1), 36–54. https://doi.org/10.1177/20427530211027721

Jamal, F. Q., & Imran, M. (2018). Extending the Technology Acceptance Model for Use of e-Learning Systems by Digital Learners. IEEE Access, 6, 73395–73404. https://doi.org/10.1109/ACCESS.2018.2881384

Jamison, H. learning: A. integrative approach to engineering education A., Kolmos, A., & Holgaard, J. E. (2014). Hybrid learning: An integrative approach to engineering education. Journal of Engineering Education, 103(2), 253–273. https://doi.org/10.1002/jee.20041

Kacetl, J., & Semradova, I. (2020). Reflection on blended learning and e-learning - case study. Procedia Computer Science, 176, 1322–1327. https://doi.org/10.1016/j.procs.2020.09.141

Kaeophanuek, S., Jaitip, N.-S., & Nilsook, P. (2018). How to enhance digital literacy skills among information sciences students. International Journal of Information and Education Technology, 8(4), 292–297. https://doi.org/10.18178/ijiet.2018.8.4.1050

Kembuan, D. R. ., & Daud, M. (2019). Hasil Belajar Mahasiswa PTB Fatek Unima Ditinjau Dari Fasilitas Belajar Dan Komitmen Belajar Mahasiswa. Jurnal Sains Dan Teknologi, 2(2), 129–136.

Khan, N., Sarwar, A., Chen, T. B., & Khan, S. (2022). Connecting digital literacy in higher education to the 21st century workforce. Knowledge Management and E-Learning, 14(1), 46–61. https://doi.org/10.34105/j.kmel.2022.14.004

Kintu, M. J., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: the relationship between student characteristics, design features and outcomes. International Journal of Educational Technology in Higher Education, 14(1). https://doi.org/10.1186/s41239-017-0043-4

Kristanto, A., Mustaji, M., & Mariono, A. (2017). The Development of Instructional Materials E-Learning Based On Blended Learning. International Education Studies, 10(7), 10. https://doi.org/10.5539/ies.v10n7p10

Kumar, S. (2016). Curriculum Enrichment for Learning Outcomes in Higher Education. International Journal of Scientific Research and Modern Education (IJSRME), I(Ii), 2455–5630.

Latip, M., Noh, I., Tamrin, M., & Latip, S. (2020). Students' acceptance for e-learning and the effects of self-efficacy in Malaysia. International Journal of Academic Research in Business and Social Sciences, 10(5), 658–674.

Latip, M. S. A., Tamrin, M., Noh, I., Rahim, F. A., & Latip, S. N. N. A. (2022). Factors affecting e-learning acceptance among students: The moderating effect of self-efficacy. International Journal of Information and Education Technology, 12(2), 116–122. https://doi.org/10.18178/ijiet.2022.12.2.1594

Li, Q., Li, Z., & Han, J. (2021). A hybrid learning pedagogy for surmounting the challenges of the COVID-19 pandemic in the performing arts education. Education and Information Technologies, 26(6), 7635–7655. https://doi.org/10.1007/s10639-021-10612-1

Liu, Q. (2021). Research on the effectiveness of hybrid teaching of general mechanical equipment maintenance course. Journal of Service Science and Management, 14(06), 627–635. https://doi.org/10.4236/jssm.2021.146039

Lukitasari, F., Nurlaela, L., Ismawati, R., & Rijanto, T. (2020). Comparison of Learning Outcomes Between Discovery Learning with Inquiry Learning Reviewed of Student Learning Independence At Vocational High School. International Journal for Educational and Vocational Studies, 2(10), 837–842. https://doi.org/10.29103/ijevs.v2i10.3305

Mihailidis, P. (2015). Digital curation and digital literacy: Evaluating the role of curation in developing critical literacies for participation in digital culture. E-Learning and Digital Media, 12(5–6), 443–458. https://doi.org/10.1177/2042753016631868

Mohammadyari, S., & Singh, H. (2015). Understanding the effect of e-learning on individual performance: The role of digital literacy. Computers and Education, 82, 11–25. https://doi.org/10.1016/j.compedu.2014.10.025

Mugenyi, J. K., & Chang, Z. (2016). Student Characteristics and Learning Outcomes in a Blended Learning Environment Intervention in a Ugandan University. The Electronic Journal of E-Learning Volume, 14(3), 181–195.

Munir, N. S., Gani, H. A., & Mappalotteng, A. M. (2022). Pengaruh Media Pembelajaran E-Learning, Gaya Belajar, Dan Motivasi Belajar Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Simulasi Dan Komunikasi Digital Kelas X Di SMK Negeri 2 Pinrang. UNM of Journal Technologycal and Vocational, 6(1), 25–34.

Munro, V., Morello, A., Oster, C., Redmond, C., Vnuk, A., Lennon, S., & Lawn, S. (2018). E-learning for self-management support: Introducing blended learning for graduate students - A cohort study. BMC Medical Education, 18(1), 1–8. https://doi.org/10.1186/s12909-018-1328-6

Nammakhunt, A., Porouhan, P., & Premchaiswadi, W. (2023). Creating and Collecting e-Learning Event Logs to Analyze Learning Behavior of Students through Process Mining. International Journal of Information and Education Technology, 13(2), 211–222. https://doi.org/10.18178/ijiet.2023.13.2.1798

Nikou, S., & Maslov, I. (2023). Finnish university students' satisfaction with e-learning outcomes during the COVID-19 pandemic. International Journal of Educational Management, 37(1), 1–21. https://doi.org/10.1108/IJEM-04-2022-0166

Orlov, G., Mckee, D., Berry, J., Boyle, A., Dicicco, T., Ransom, T., Rees-jones, A., & Stoye, J. (2021). Learning during the COVID-19 pandemic : It is not who you teach , but how you teach. Economics Letters, 202, 109812. https://doi.org/10.1016/j.econlet.2021.109812

Peng, R., & Fu, R. (2021). The effect of Chinese EFL students' learning motivation on learning outcomes within a blended learning environment. Australasian Journal of Educational Technology, 37(6), 61–74. https://doi.org/10.14742/ajet.6235

Perdana, R., Yani, R., Jumadi, J., & Rosana, D. (2019). Assessing Students' Digital Literacy Skill in Senior High School Yogyakarta. JPI (Jurnal Pendidikan Indonesia), 8(2), 169. https://doi.org/10.23887/jpi-undiksha.v8i2.17168

Prasetyo, C. D., Suja, S. I., & Asrori, A. R. M. (2021). Pengaruh Gaya Belajar, Minat Belajar, dan Fasilitas Belajar Terhadap Hasil Belajar Ilmu Pengetahuan Sosial Siswa Kelas V SD Negeri 1 Besuki Kecamatan Besuki Kabupaten Tulungagung. Jurnal Pendidikan Tambusai, 5(3), 5744–5752.

Pratama, W. A., Hartini, S., & Misbah, M. (2019). Analisis literasi digital siswa melalui penerapan e-learning berbasis schoology. Jurnal Inovasi Dan Pembelajaran Fisika, 6(1), 9–13.

Puriwat, W., & Tripopsakul, S. (2021). The impact of e-learning quality on student satisfaction and continuance usage intentions during covid-19. International Journal of Information and Education Technology, 11(8), 368–374. https://doi.org/10.18178/ijiet.2021.11.8.1536

Purnama, S., Ulfah, M., Machali, I., Wibowo, A., & Narmaditya, B. S. (2021). Does digital literacy influence students' online risk? Evidence from Covid-19. Heliyon, 7(6), e07406. https://doi.org/10.1016/j.heliyon.2021.e07406

Puspitasari, Siska, Hayati, K. N., & Purwaningsih, A. (2022). Efektivitas Penggunaan Model Blended Learning Terhadap Motivasi Belajar dan Hasil Belajar IPS. Jurnal Basicedu, 6(1), 1252–1262. https://doi.org/10.31004/basicedu.v6i1.2186

Puspitasari, Susy. (2018). Hubungan minat dan aktivitas dalam tutorial online dengan hasil belajar mahasiswa. Jurnal Teknologi Pendidilkan Dan Pembelajaran, 5(2), 156–164.

Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2020). A systematic literature review on synchronous hybrid learning: gaps identified. Learning Environments Research, 23(3), 269–290. https://doi.org/10.1007/s10984-019-09303-z

Rahayu, P., & Iswari, R. S. (2021). The Effectiveness of Blended Learning Models toward The Motivation and Learning Outcomes of High School Students in Ecological Materials. Journal of Biology Education, 10(2), 163–170.

Rahayu, W. P., Hidayatin, H., & Churiyah, M. (2020). Development of a Project-Based Learning Assessment System to Improve Students' Competence. Jurnal Pendidikan Ekonomi Dan Bisnis (JPEB), 8(2), 86–102. https://doi.org/10.21009/jpeb.008.2.1

Rahmaniah, F. (2022). The use of hybrid teaching to teach English in vocational high school. ENLIT Journal, 2(1), 24–36. https://doi.org/10.33654/enlit.v2i1.1638

Rashid, S., & Yadav, S. S. (2020). Impact of Covid-19 Pandemic on Higher Education and Research. Indian Journal of Human Development, 3(1), 1–4. https://doi.org/10.1177/0973703020946700

Robroo, I. (2019). The effect of using e-learning for enhancing active learning of pre-service teachers. International Journal of Information and Education Technology, 9(11), 799–804. https://doi.org/10.18178/ijiet.2019.9.11.1307

Sembiring, Z., Yudistira, D., Zulkarnaen, I., & Masdani. (2021). Implikasi Penerapan Metode Pembelajaran Terhadap Hasil Belajar Bagi Mahasiswa Yang Memiliki Minat Belajar Tinggi. Jurnal Pendidikan Dan Teknologi, 2(1), 14–19.

Singh, A. K., & Meena, M. K. (2022). Challenges of virtual classroom during COVID-19 pandemic : An empirical analysis of Indian higher education. 11(1), 207–212. https://doi.org/10.11591/ijere.v11i1.21712

Singh, J., Steele, K., & Singh, L. (2021). Combining the Best of Online and Face-to-Face Learning: Hybrid and Blended Learning Approach for COVID-19, Post Vaccine, & Post-Pandemic World. In Journal of Educational Technology Systems (Vol. 50, Issue 2). https://doi.org/10.1177/00472395211047865

Sukiman, Haningsih, S., & Rohmi, P. (2022). The pattern of hybrid learning to maintain learning effectiveness at the higher education level post covid-19 pandemic. European Journal of Educational Research, 11(3), 1245–1257.

Sumin, S., Salleh, K. M., & Nurdin, N. (2021). The effect of external factors moderated by digital literacy on the actual use of e-learning during the Covid-19 pandemic in Islamic universities in Indonesia. Research and Evaluation in Education, 7(2), 132–144. https://doi.org/10.21831/reid.v7i2.44794

Tai, D. W. S., Zhang, R.-C., Wang, Y.-T., & Wang, R. (2017). Determining digital literacy competencies in technical senior high schools using fuzzy delphi analysis. International Journal of Information and Education Technology, 7(8), 612–616. https://doi.org/10.18178/ijiet.2017.7.8.941

Tang, C. M., & Chaw, L. Y. (2016). Digital Literacy : A Prerequisite for Effective Learning in a Blended Learning Environment? The Electronic Journal of E-Learning, 14(1), 54–65.

Utami, P. S. (2016). Pengaruh gaya belajar dan metode pembelajaran terhadap hasil belajar ips siswa SMP. Jurnal Dimensi Pendidikan Dan Pembelajaran, 4(1), 9–16. https://doi.org/10.24269/dpp.v4i1.54

Wei, X., Saab, N., & Admiraal, W. (2023). Do learners share the same perceived learning outcomes in MOOCs? Identifying the role of motivation, perceived learning support, learning engagement, and self-regulated learning strategies. Internet and Higher Education, 56(July 2021), 100880. https://doi.org/10.1016/j.iheduc.2022.100880

Wijaya, R., Lie, D., Efendi, E., & Wijaya, A. (2018). Pengaruh Fasilitas Belajar Dan Motivasi Belajar Terhadap Hasil Belajar Pada Smp Kristen Kalam Kudus Pematangsiantar. Maker: Jurnal Manajemen, 2(1), 17–28. https://doi.org/10.37403/maker.v2i1.33

Yang, M., Kim, J., & Korea, S. (2014). Correlation between Digital Literacy and Self-Regulated Learning Skills of Learners in University E-Learning Environment. Advanced Science and Technology Letters, 71, 80–83.

Yashalova, N. N., Shreider, N. V., & Yakovleva, E. N. (2019). Digital Literacy in Society: The Situation, Problems, and Prospects at the Current Stage of Scientific and Technical Progress. Scientific and Technical Information Processing, 46(4), 213–218. https://doi.org/10.3103/S0147688219040042