

# Digital Learning: How the Process Enhances Students' Digital Literacy

Adelia Alfama Zamista<sup>1\*</sup>, Khairul Azmi<sup>2</sup>

<sup>1</sup>Physics Education Department, UIN Imam Bonjol Padang, West Sumatera, Indonesia.

<sup>2</sup>Information Technology Department, Sekolah Tinggi Teknologi Dumai, Riau, Indonesia

Received: July 29, 2023

Revised: September 18, 2023

Accepted: September 25, 2023

Published: September 30, 2023

Corresponding Author:

Adelia Alfama Zamista

[adelia.zamista@uinib.ac.id](mailto:adelia.zamista@uinib.ac.id)

DOI: [10.29303/jppipa.v9i9.5401](https://doi.org/10.29303/jppipa.v9i9.5401)

© 2023 The Authors. This open access article is distributed under a (CC-BY License)



**Abstract:** Information and Communication Technology (ICT) is now frequently applied in education. This makes the learning process one of the activities that can empower digital literacy. The research aims to explore information about students' digital literacy levels based on their self-assessment and how the learning process can train the indicators on digital literacy to students. This research was conducted using a qualitative descriptive approach. Using a purposive sampling technique, the sample for this research was 38 Tadris IPA students who had participated in lecture activities with digital learning substitution. The research instrument is a digital literacy level self-assessment questionnaire which refers to a global framework of reference on digital literacy skills which consists of 4 digital literacy sub-indices. The results showed that Tadris Physics students had a digital literacy index in the good category. This is supported by the implementation of lectures that provide opportunities for students to empower their digital literacy, such as the implementation of digital technology-based learning (use of LMS or blended learning), and an assignment system that requires students to think critically while searching for information independently through various digital platforms.

**Keywords:** Digital literacy; Digital learning; Self-assessment

## Introduction

Information and communication technology is now a very important part of life. Almost all aspects of life utilize ICT as a means to make activities more effective and efficient. Likewise, the education system is currently actively incorporating ICT into it. Learning activities are increasingly dependent on ICT, starting with the use of technological devices such as projectors to present teaching materials, utilizing various electronic learning resources, conducting evaluations online, even face-to-face learning activities are now transitioning into blended learning activities by incorporating technology-assisted components (Ak et al., 2021; Deswita & Zamista, 2021; Purnasari & Sadewo, 2020; Salsabila, Sari, Lathif, Lestari, & Ayuning, 2020).

Digital literacy is defined as an individual's ability to utilize information and communication technology to find relevant information, evaluate it critically, and work based on the information they have obtained (Hague &

Payton, 2011; Maulana, 2015; Naufal, 2021; Rizal et al., 2022). In learning, Chaw stated that digital literacy is one of the skills that students must possess in order to participate effectively in distance learning (Tang & Chaw, 2016). Furthermore, Maulana stated that digital literacy can save learning time because it facilitates the implementation of effective and efficient learning, makes students feel safer in obtaining information, and supports them in making the best decisions. Therefore, it can be assumed that good digital literacy will have an impact on good learning outcomes as well (Giovanni & Komariah, 2019; Jayanti, Aryana, & Gunamantha, 2017; Maulana, 2015).

Various studies have been conducted regarding the influence of learning implementation and the use of learning media to increase students' digital literacy. For example, research conducted by Nadia Risya Faridah entitled "Efektifitas Model Pembelajaran Project Based Learning terhadap Kemampuan Literasi Numerasi dan Literasi Digital Peserta Didik Madrasah Ibtidaiyah"

## How to Cite:

Zamista, A.A., & Azmi, K. (2023). Digital Learning: How the Process Enhances Students' Digital Literacy. *Jurnal Penelitian Pendidikan IPA*, 9(9), 7189-7195. <https://doi.org/10.29303/jppipa.v9i9.5401>

shows that the PjBL model can increase students' digital literacy (Faridah, Afifah, & Lailiyah, 2022). Many other studies also indicate that certain student-centered learning models and interactive learning media, which enable students to learn independently can enhance students' digital literacy (Hartino, Adha, Ulpa, Rifai, & Rhosita, 2021; Hazmi, Tahir, & Turmuzi, 2021; Mustakim, Shoffa, & Hidayatullah, 2019; Setiadi, Alia, & Nugraha, 2022; Winarni, Kumalasari, Marlina, & Rohati, 2021). However, it is quite rare to find research that explores how students' self-assessment of learning activities can facilitate their improvement digital literacy.

Self-assessment is an assessment technique carried out by asking students to assess themselves regarding aspects of attitudes, skills and knowledge (Salamah, 2018). As a form of skill, the level of scientific literacy can also be measured by conducting a self-assessment. This research will focus on exploring information about students' self-assessed digital literacy levels and how the lecture process contributes to improving them.

**Method**

This research uses a qualitative descriptive approach to determine students' digital literacy levels and how the learning process influences their digital literacy levels. The students sampled in this research were 38 Tadris Physics students who had experience participating in digital learning. Sample selection was carried out through purposive sampling.

Data collection was conducted using a questionnaire distributed online using Google Form. The measurement of digital literacy levels refers to "a global framework of reference on digital literacy skills", consisting of four sub-indices: 1) information and data literacy sub-index, 2) communication and collaboration sub-index, 3) security sub-index, and 4) technology capability sub-index. The questionnaire's statement

items are based on those used by Kominfo during a digital digital literacy survey in 2020, but the questionnaire used in this study was first validated by an expert to ensure its appropriateness for students use.

The data from respondents' answers in the questionnaire is then calculated and the average value is determined. This average value is subsequently interpreted by referring to Table 1.

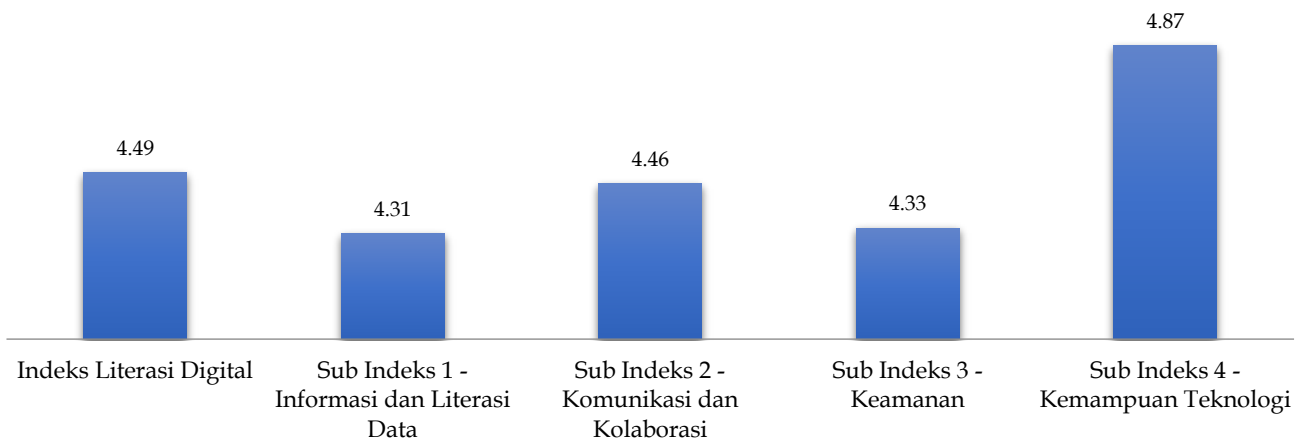
**Table 1.** Interpretation For Students' Digital Literacy (Kominfo, 2020)

Average Score	Interpretation
$\bar{X} = 5$	Very good
$4 \leq \bar{X} < 5$	Good
$3 \leq \bar{X} < 4$	Moderate
$2 \leq \bar{X} < 3$	Poor
$1 \leq \bar{X} < 2$	Very poor

**Result and Discussion**

Digital literacy is defined as the skill to understand and use information in the digital era and how to process this information which will influence interaction patterns in society (Asari, Kurniawan, Ansor, & Putra, 2019; UNESCO, 2018). In the field of education, technology is currently an important aspect that is being encouraged to be integrated into all aspects of educational implementation. Technology is being applied in various aspect, including media, facilities, and methods of educational delivery. This condition requires teachers, as well as prospective teachers, to be technologically literate (Sholihah, 2022; Yamin & Fakhrunnisaa, 2022).

Tadris Physics students who are projected as prospective Physics teachers must also have skills in using technology. Based on the contents of the student digital literacy index questionnaire, it is generally known that the student digital literacy index is in the good category with an average score of 4.49. As shown in Figure 1.



**Figure 1.** Students' digital literacy index

The description of the student digital literacy index for each sub-index is as follows:

#### *Sub-index 1: Information and Data Literacy*

This sub-index of information and data literacy is related to students' ability to search for information by utilizing technology (Izzati & Nurcahaya, 2022; Ririen & Daryanes, 2022). Furthermore, the ability to search for information is also complemented by the capacity for critical thinking to discern the reliability of the information.

##### 1. Information and Data Literacy

This section focuses on looking at students' abilities in accessing information by utilizing technology. A person with a good index of information and data literacy is capable of demonstrating various abilities, including the ability to search for and access data and information on digital media as needed, filter data and information in digital media according to their requirements, manage searches for data, information, and content on social media according to their needs, and store data, information, and content in digital media.

The results of research data analysis show that the digital literacy level of Tadris Physics students for sub-index 1: information and digital literacy of students is in the good category. Based on the results of further investigation, it is known that this skill is trained in the lecture process. Current lectures require students to be able to search for data from various digital sources. Even students are currently required to access scientific journals to complete their assignments.

The shift in the learning implementation paradigm from all print-based teaching materials to digital sources is also one of the supports for the student digital literacy index in the data literacy section being in the good category (Ruenphongphun, Sukkamart, & Pimdee, 2021).

##### 2. Critical Thinking

The indicator of critical thinking in digital literacy is a person's skill in sorting out which information is right or wrong, including finding out who the author of information is and what the author's track record is. The results of data analysis show that the digital literacy level of Tadris Physics students in the critical thinking indicator is in the good category.

Further investigation results also show that this is an implication of the lecture activities carried out. For example, one form of assignment that is commonly given to students is writing a paper or discussion report. To complete this assignment, students must practice their ability to filter information, sort and organize the information they have obtained into one complete

report. When completing report assignments, students are required to seek information from trusted sources and even include citations, which is an activity that is closely related to indicators of critical thinking in digital literacy.

In this section, lecturers as facilitators also play a big role in training digital literacy to students. For example, the lecturer's firmness in rejecting plagiarism by checking using Turnitin makes students learn to paraphrase which of course requires the ability to think critically in processing digital information (Sholihah, 2022).

#### *Sub-index 2: Communication and Collaboration*

Sub-index 2: communication and collaboration refers to an individual's ability to use digital technology to communicate with others and collaborate in various contexts, both personally and professionally. The results of data analysis for the digital literacy level of Tadris Physics students in sub-index 2 are as follows:

##### 1. Communication Ability

The focus of communication skills in this student digital literacy index research is students' communication skills through various digital technology communication devices. The results of data analysis show that the level of students' communication skills via digital communication devices is in the good category.

The results of the researchers' discussions with respondents showed that results like those above were due to students being accustomed to using various applications to communicate with digital technology. One of the applications that is the respondents' favorite is Whatsapp. This is in line with what Sintia Nurlita expressed in the anthology titled "The Urgency of Communication in Social Sciences," which states that one of the widely used communication applications today is WhatsApp because it offers various features that support smooth communication (Nurlita, 2023).

In addition, currently the majority of lecturers create lecture groups on the WA application, then lecturers often share lecture material through the WA group, as well as taking advantage of the learning management system available on campus. The results of this research are in line with the results of Pratolo and Solikhati's research which states that the use of message sharing applications such as Whatsapp to share lecture materials and information can support the development of digital literacy (Pratolo & Solikhati, 2020). The majority of respondents also stated that they were proficient in various information and data via digital technology, for example sharing photos via Whatsapp or share various types of files via google drive.

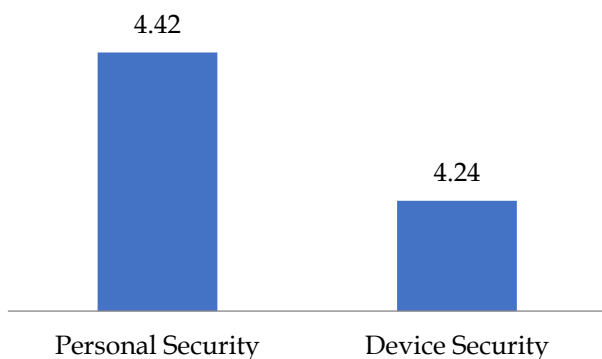
## 2. Ethics in Technology

The next indicators in sub-index 2 are ethics and technology. This understanding of ethics in communicating and collaborating online includes activities to avoid harmful behavior, avoid spreading hoaxes, and avoid online harassment. Students as respondents stated that they were aware of hoax news, so before spreading information students were accustomed to ensuring the truth of the information. This is proof that in terms of ethical indicators in technology, students are already in the good category.

Referring again to the part of students fulfilling their course assignments, previously it was mentioned that student assignments are generally in the form of papers. The obligation to make quotations according to correct citation rules with the help of citation applications is also an example of lecture activities that support the empowerment of students' digital literacy (Agussalim & Handayani, 2023; Sholihah, 2022).

### Sub-index 3: Security

The increasing use of information technology also increases the potential for cybercrime such as the spread of hoaxes, fraud, theft and misuse of data (Ariyaningsih, Andrianto, Kusuma, & Prastyanti, 2023; Kusumaningrum, Wijayanto, & Raharja, 2022). To avoid being affected by cyber crime, of course digital technology users must understand about maintaining digital security, so one of the sub-indices in digital literacy is security.



**Figure 2.** Average Digital Literacy Score of Students for Sub Index 3 - Security

The measurement of the digital literacy index in the security sub-index includes aspects of personal security and device security. This section aims to measure individual understanding and skills in protecting themselves and devices from cyber threats. It can be seen that the digital literacy level of Tadris Physics students in sub-index 3: security is also in the good category. However, for personal security, the average score is slightly better than for device security indicators, as

shown in Figure 2. Students as respondents stated that they are accustomed to maintaining the confidentiality of passwords for the various applications they use and also strictly limiting personal information such as NIK on social media, thereby ensuring personal security. However, for device security it is known that the average score is 0.18 lower than the average personal security score, this is indicated by students who stated that sometimes they do not use *software* to find viruses on *cell phone*, they are also sometimes unable to distinguish between emails that contain spam or viruses.

Previous research related to this security sub-index states that generally people are in an average position or category, which means that technology users still have the opportunity to experience cyber attacks (Alif & Pratama, 2021; Kusumaningrum et al., 2022; Wijayanto & Prabowo, 2020). Seeing the differences between the results of this research and previous research, the researchers tried to explore this further by conducting interviews with several respondents. Interviews were conducted to dig deeper into information about students' knowledge of digital security and cyber crime and how they anticipate cyber crimes. The results of this further investigation show that it is indeed knowledge-based. Students are good at understanding the importance of cyber security, but they still need to familiarize themselves with cyber security rules so they can truly avoid the risk of cyber crime.

### Sub-index 4: Technological Capability

The fourth sub-index in the digital literacy index is the ability to use technology. This aspect measures the extent to which individuals have knowledge and practical skills in using various digital technologies. In this study, according to the questionnaire distributed, there were four main points in the ability to use technology that were measured, namely: a) the ability to connect devices to a WiFi network, b) the ability to download files/applications from the internet, c) upload capability files to the internet, and d) being able to install programs/applications on the device. The research results show that both male and female students have good abilities in this aspect.

The average score of sub-index 4: ability to use student technology is 4.87. Compared to other sub-indices, this is the sub-index with the highest average score. It can be concluded that students as respondents are very proficient in connecting devices to WiFi networks, uploading and downloading files using the internet, and installing programs or applications *to gadget* they. Students' skills in doing the things mentioned above cannot be separated from lecture activities that require and practice these things. For example, during lectures, lecturers are free for students to search for information via the internet, and the

campus itself provides the internet network free of charge via the wifi network so that students are trained to connect their devices to the campus wifi network.

Likewise with the ability to upload and download files via the internet, lectures during this period can be said to be inseparable from these two activities. Lecturers very often provide lecture materials and modules in the form of files that students must download. Recently, assignment submissions often use LMS or Google classroom so that to collect assignments students are forced to be adept at uploading their assignment files to the LMS or platform others of the same kind. Furthermore, various programs make it easier for students to do their assignments, such as making assignments power point can be created with the application canva, so that students are also trained to be able to install and use various digital applications in completing lecture assignments.

## Conclusion

The results of this research show that, in general, the level of student digital literacy falls within the 'good' category. This can be attributed to learning activities that offer numerous opportunities for students to interact with digital technology, thereby empowering their digital literacy. One of the activities that students find particularly supportive of their mastery of digital literacy is learning activities that are based on digital technology, such as the use of LMS or blended learning, and assignment systems that require students to think critically while independently searching for information through various digital platforms.

## Author Contributions

The authors were involved in the overall writing this article.

## Funding

This research received no external funding

## Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this article.

## References

- Agussalim, A., & Handayani, D. N. (2023). Pemanfaatan Teknologi dalam Penulisan Karya Tulis Ilmiah untuk Mencegah Plagiasi. *Jurnal Pengabdian Pada Masyarakat (J-PMas)*, 2(1), 7–21. Retrieved from <https://e-journal.unbita.ac.id/home/index.php/J-PMas/article/view/58>
- Ak, M. F., Darmayani, S., Nendissa, S. J., Arifudin, O., Anggaraeni, F. D., Hidana, R., ... Febriani, R. (2021). *Pembelajaran Digital*. Penerbit Widina.
- Alif, M. S., & Pratama, A. R. (2021). Analisis kesadaran keamanan di kalangan pengguna E-Wallet di Indonesia. *Automata*, 2(1). Retrieved from <https://journal.uui.ac.id/AUTOMATA/article/view/17279>
- Ariyaningsih, S., Andrianto, A. A., Kusuma, A. S., & Prastyanti, R. A. (2023). Korelasi Kejahatan Siber dengan Percepatan Digitalisasi di Indonesia. *Justisia: Jurnal Ilmu Hukum*, 1(1), 1–11. <https://doi.org/10.56457/jjih.v1i1.38>
- Asari, A., Kurniawan, T., Ansor, S., & Putra, A. B. N. R. (2019). Kompetensi literasi digital bagi guru dan pelajar di lingkungan sekolah kabupaten Malang. *BIBLIOTIKA: Jurnal Kajian Perpustakaan Dan Informasi*, 3(2), 98–104. <http://dx.doi.org/10.17977/um008v3i22019p98-104>
- Deswita, P., & Zamista, A. A. (2021). Model Penerimaan Teknologi Mahasiswa Calon Guru Terhadap Berbagai Aplikasi Selama Pembelajaran Dalam Jaringan dan Kesiapan Mereka Menjadi Pendidik Bagi Generasi Z dan Alpha. *Jurnal Penelitian Bidang Pendidikan*, 27(2), 33–44. <https://doi.org/10.24114/jpbp.v27i2.28329>
- Faridah, N. R., Afifah, E. N., & Lailiyah, S. (2022). Efektivitas Model Pembelajaran Project Based Learning Terhadap Kemampuan Literasi Numerasi dan Literasi Digital Peserta Didik Madrasah Ibtidaiyah. *Jurnal Basicedu Vol*, 6(1). Retrieved from <https://jbasic.org/index.php/basicedu/article/view/2030>
- Giovanni, F., & Komariah, N. (2019). Hubungan antara literasi digital dengan prestasi belajar siswa SMA Negeri 6 Kota Bogor. *LIBRARIA: Jurnal Perpustakaan*, 7(1), 147–162. <http://dx.doi.org/10.21043/libraria.v7i1.5827>
- Hague, C., & Payton, S. (2011). Digital literacy across the curriculum. *Curriculum Leadership*, 9(10).
- Hartino, A., Adha, M., Ulpa, E., Rifai, A., & Rhosita, R. (2021). *Efektivitas Pembelajaran Daring Dalam Meningkatkan Literasi Digital*. repository.lppm.unila.ac.id. Retrieved from <http://repository.lppm.unila.ac.id/id/eprint/28739>
- Hazmi, H. Y., Tahir, M., & Turmuzy, M. (2021). Implementasi blended learning pada proses pembelajaran 4.0 dalam rangka meningkatkan literasi digital peserta didik kelas 5 SDN 5 cakranegara. *Renjana Pendidikan Dasar*, 1(2), 109–115. Retrieved from <https://prospek.unram.ac.id/index.php/renjana/article/view/89>

- Izzati, A. U., & Nurcahaya, C. (2022). Dampak Pemberian Workshop Terhadap Literasi Digital Peserta Workshop: Studi Kasus Salah Satu Komunitas Umkm Di Kota Palembang. *Among Makarti*, 15(2). <http://dx.doi.org/10.52353/ama.v15i2.305>
- Jayanti, E. D., Aryana, I. B. P., & Gunamantha, I. M. (2017). Pengaruh Model Pembelajaran Sains Teknologi Masyarakat terhadap Hasil Belajar Ipa Ditinjau dari Literasi Digital Siswa Kelas V Sekolah Dasar Gugus VI Kecamatan Mengwi. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, 1(2), 55–64. Retrieved from [https://ejournal-pasca.undiksha.ac.id/index.php/jurnal\\_pendas/article/view/2681](https://ejournal-pasca.undiksha.ac.id/index.php/jurnal_pendas/article/view/2681)
- Kominfo. (2020). Status Literasi Digital Indonesia Survei di 34 Provinsi. Retrieved August 30, 2022, from Kementerian Komunikasi dan Informatika Republik Indonesia Direktorat Jenderal Aplikasi Informatika Retrieved from <https://aptika.kominfo.go.id/wp-content/uploads/2020/11/Survei-Literasi-Digital-Indonesia-2020.pdf>
- Kusumaningrum, A., Wijayanto, H., & Raharja, B. D. (2022). Pengukuran tingkat kesadaran keamanan siber di kalangan mahasiswa saat study from home dengan multiple criteria decision analysis (MCDA). *Jurnal Ilmiah SINUS*, 20(1), 69–78. <http://dx.doi.org/10.30646/sinus.v20i1.586>
- Maulana, M. (2015). Definisi, Manfaat, dan Elemen Penting Literasi Digital. *Seorang Pustakawan Blogger*, 1(2).
- Mustakim, M., Shoffa, S., & Hidayatullah, A. (2019). Pengembangan perangkat pembelajaran blended learning berbasis schoology untuk meningkatkan literasi digital matematika. *Jumlahku: Jurnal Matematika Ilmiah STKIP Muhammadiyah Kuningan*, 5(1), 88–99. <https://doi.org/10.33222/jumlahku.v5i1.585>
- Naufal, H. A. (2021). Literasi digital. *Perspektif*, 1(2), 195–202.
- Nurlita, S. (2023). Penggunaan Whatsapp Sebagai Media Komunikasi Dikalangan Mahasiswa. *Urgensi Komunikasi Dalam Ilmu Sosial: Bunga Rampai*, 62. Retrieved from <http://eprints.umm.ac.id/id/eprint/24848>
- Pratolo, B. W., & Solikhati, H. A. (2020). The implementation of digital literacy in indonesian suburban EFL classes. *International Journal of Scientific and Technology Research*, 9(1), 1508–1512.
- Purnasari, P. D., & Sadewo, Y. D. (2020). Pemanfaatan teknologi dalam pembelajaran sebagai upaya peningkatan kompetensi pedagogik. *Publikasi Pendidikan*, 10(3), 189–196. <https://doi.org/10.26858/publikan.v10i3.15275>
- Ririen, D., & Daryanes, F. (2022). Analisis literasi digital mahasiswa. *Research and Development Journal of Education*, 8(1), 210–219. <http://dx.doi.org/10.30998/rdje.v8i1.11738>
- Rizal, C., Rosyidah, U. A., Yusnanto, T., Akbar, M. R., Hidayat, L., Setiawan, J., ... Rahajeng, E. (2022). *Literasi digital*. Get Press.
- Ruenphongphun, P., Sukkamart, A., & Pimdee, P. (2021). Thai Undergraduate Digital Citizenship Skills Education: A Second-Order Confirmatory Factor Analysis. *World Journal on Educational Technology: Current Issues*, 13(3), 370–385. <http://dx.doi.org/10.18844/wjet.v13i3.5937>
- Salamah, U. (2018). Penjaminan mutu penilaian pendidikan. *EVALUASI: Jurnal Manajemen Pendidikan Islam*, 2(1), 274–293. <http://dx.doi.org/10.32478/evaluasi.v2i1.79>
- Salsabila, U. H., Sari, L. I., Lathif, K. H., Lestari, A. P., & Ayuning, A. (2020). Peran teknologi dalam pembelajaran di masa pandemi covid-19. *Al-Mutharahah: Jurnal Penelitian Dan Kajian Sosial Keagamaan*, 17(2), 188–198.
- Setiadi, P. M., Alia, D., & Nugraha, D. (2022). Pengembangan Bahan Ajar Digital dalam Blended Learning Model untuk Meningkatkan Literasi Digital Mahasiswa. *EDUKATIF: Jurnal Ilmu Pendidikan*, 4(3), 3353–3360. <https://doi.org/10.31004/edukatif.v4i3.2727>
- Sholihah, M. (2022). Profil Literasi Digital Mahasiswa Calon Guru di Universitas Islam Balitar. *Konstruktivisme: Jurnal Pendidikan Dan Pembelajaran*, 14(2), 180–186. <https://doi.org/10.35457/konstruk.v14i2.1892>
- Tang, C. M., & Chaw, L. Y. (2016). Digital Literacy: A Prerequisite for Effective Learning in a Blended Learning Environment?. *Electronic Journal of E-Learning*, 14(1), 54–65.
- UNESCO. (2018). A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2. Retrieved August 31, 2022, from UNESCO Institute for Statistics Retrieved from <http://uis.unesco.org/sites/default/files/documents/ip51-global-framework-reference-digital-literacy-skills-2018-en.pdf>
- Wijayanto, H., & Prabowo, I. A. (2020). *Kesiapan Perguruan Tinggi Wilayah Jawa Tengah Dalam Menghadapi Serangan Siber: Policy Brief*. Lembaga Penelitian dan Pengabdian pada Masyarakat Universitas Dian Nuswantoro.
- Winarni, S., Kumalasari, A., Marlina, M., & Rohati, R. (2021). Efektivitas video pembelajaran matematika untuk mendukung kemampuan literasi numerasi dan digital siswa. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 10(2), 574–583. <http://dx.doi.org/10.24127/ajpm.v10i2.3345>

Yamin, M., & Fakhrunnisaa, N. (2022). Persepsi Literasi Digital Mahasiswa Calon Guru IAIN Palopo. *SAP (Susunan Artikel Pendidikan)*, 7(1), 1-9. Retrieved from <https://journal.lppmunindra.ac.id/index.php/SAP/article/view/13294>