



Opportunities and Challenges of Hybrid Learning in Higher Education in Terms of Student's Digital Literacy Capabilities

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Abstract: The research aims to analyze the map of students' digital literacy capabilities as opportunities and challenges in implementing hybrid learning. The research uses a survey method with descriptive analysis. The sample was 35 Mathematics Education students, FMIPA, Indraprasta PGRI University, taken using a purposive sampling technique. The research results showed 82.83% digital literacy skills, with the largest percentage being the ability to use technology, namely 30.0% and information and data literacy skills at 21.83%, communication skills at 12.68%, critical thinking at 12.20%, and digital security (e-safety) capabilities of 11.74%. These results show that students' digital literacy skills are still not evenly distributed in every dimension, where the ability to use technology and information and data literacy is quite good, while communication, critical thinking and digital security skills are still lacking. The implementation of hybrid learning is still in the transition stage, namely the ability to utilize technology, literacy and data information. Thus, based on the map of students' digital literacy abilities, it can be concluded that students' digital literacy abilities need to be improved to answer the opportunities and challenges of implementing hybrid learning.

Keywords: Digital literacy capabilities; Higher education; Hybrid learning

Introduction

Learning in the era of communication and information technology through the application of hybrid learning is a quite elegant solution and has been applied at various levels of education, including universities. Hybrid learning is not something new, and although hybrid learning tends to be suitable for learning at the student level, its implementation is not easy, so a study is needed so that the application of hybrid learning can facilitate learning. Hybrid learning is a learning model that requires skills in obtaining and processing information, and knowledge, materials or learning materials in digital form and requires skills in technology, communication and information. The use of information and communication technology and digital literacy has now become an innovation applied in the world of education (Aprilia et al., 2023). Simultaneously, hybrid learning can have an impact on improving student learning outcomes such as motivation, cognitive

skills, communication skills, discipline, connections, mathematical representation and student learning independence (Helsa et al., 2022). Hybrid learning is learning that is suitable for complementarity between online and offline learning (Gultom et al., 2022). Hybrid learning is a combination of distance learning activities and face-to-face learning methods (Megalina et al., 2023). The hybrid learning model is a learning model that combines online and offline (face-to-face) learning simultaneously by utilizing technological developments effectively (Sitepu et al., 2022). Hybrid learning has catalysed the adaptation of immersive technology as an artefact in object-based learning and student-centred learning (Kee et al., 2023). Obstacles in hybrid learning include limitations in terms of knowledge, and skills or abilities in mastering technology, computer devices, and basic knowledge about hybrid learning (Ismunandar & Nandang, 2022). Meanwhile, one form of integrating the internet in the learning process is the application of hybrid learning (Rahayu et al., 2019). The use of digital

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information technology in hybrid learning affects students' digital literacy skills, especially the ability to operate or access media and the ability to obtain information (Amizera et al., 2022). Thus, the use or use of technology is very important and supports hybrid learning.

The implementation of hybrid learning after implementing online learning is an opportunity and a challenge, especially in the Mathematics Education study program, FMIPA, Indraprastha PGRI University. A comprehensive study, field research, is needed to determine the potential, infrastructure support, and readiness of students to have digital literacy skills. It is important to carry out research considering the characteristics and abilities of students, the application of learning during transition periods, and to analyze the need for hybrid learning to facilitate student learning. Digital literacy skills are one of the supporting factors in hybrid learning, such as using technological devices, learning applications, learning management systems, and critically searching, processing and filtering various digital materials and understanding digital security. Therefore, it is important to carry out studies to find out the map of students' digital literacy abilities, so that the implementation of hybrid learning has quality.

One of the capabilities that plays an important role in facilitating independent learning and determining learning success is the ability to utilize ICT (Dinata, 2021). Digital literacy and technological integration is the cultivation of the 21st century skills which are collaboration, communication, creativity and critical thinking (Keengwe & Onchwari, 2020). Students' digital literacy, especially those related to digital learning skills in the 21st century, is still relatively low (Rahmadi & Hayati, 2020). Digital literacy is an important ability to improve (Nugroho, 2022). In 2021, the Indonesian Ministry of Communication and Information formulated the concept of digital literacy as the ability to use digital technology to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately for the purposes of employment, decent work and entrepreneurship. This includes different abilities, such as computer literacy, information technology literacy, media literacy, and so on (Isabella et al., 2023). Digital literacy is a person's attitude and skills to obtain, create, solve and convey information to society using sophisticated digital technology (Fadhilah, 2021). Digital literacy is an individual's interest in attitudes and abilities in using digital technology and communication tools to access, manage, analyze and evaluate information, build new knowledge, and communicate with other people in order to participate effectively and productively (Nurlaili, 2022). The level of digital literacy is considered

very high, where the student attribute is being able to carry out digital activities independently and even being able to help other people who are experiencing difficulties (Oetomo et al., 2023). Digital literacy is the skill in obtaining, understanding, processing and presenting information in digital form using communication and information technology devices. The research aims to determine the description of students' digital literacy abilities in hybrid learning. The main functions of digital literacy today include: being able to use various things digitally, not being dependent on digital, such as thinking creatively and innovatively, being able to socialize wisely with digital, and able to collaborate with many people (Muliani et al., 2021). Digital literacy needs to be improved so that students have sufficient knowledge, understanding and skills to make it easier to participate in hybrid learning, such as searching for and selecting materials and data needed to fulfill assignments.

Efforts to improve students' digital literacy become better so that they can meet the demands of the internet-based independent learning trend (Buwono & Dewantara, 2020). Digital literacy develops along with advances in technology and communication which require students to understand information from various digital devices used in learning activities (Chairunisa & Zamhari, 2022). Applying digital literacy in online learning, students remain enthusiastic about learning, utilize various technological media and digital devices, have mastery of technological media that support online learning, collaborate with other students and lecturers and have independent learning skills (Fitriani et al., 2022). Digital literacy does not only revolve around the ability to use new technology, learn to use new devices, or even apply these devices and technology to the learning process (Hasanah & Setiaji, 2019). Digital literacy competency is very necessary with the increasing openness of information that needs to be traced for its truth and accuracy to be processed according to needs, so that to obtain this competency, user experience in using digital media is an absolute must (Rosalina et al., 2021). The use of digital media in online learning is still very limited, where students and lecturers have not adapted and are not ready to implement learning that is completely carried out online which cannot be separated from digital literacy skills (Anggrasari, 2020). Research findings show that students already understand the digital world well, but not all of them can use it according to their needs (Amelia & Ulumu, 2019). The development of the digital world must be filled with positive cultural growth including digital literacy (Sangaji & Pribadi, 2023). Every individual needs to understand that digital

literacy is an important thing needed to be able to participate in today's modern world (Hafiza et al., 2022).

Opportunities and challenges for implementing hybrid learning by mapping student abilities include digital literacy through surveys. This is done in order to obtain an overview of digital literacy skills, as a reference in designing learning. This research is the first step to provide input in implementing hybrid learning, so that it can anticipate student readiness, one of which is digital literacy skills, by raising awareness, empowerment and developing digital literacy skills. This research question is what are the opportunities and challenges of implementing hybrid learning in higher education in terms of students' digital literacy abilities. Mapping digital literacy skills in the dimensions of information and data literacy, critical thinking, using technology, communication and digital security (e-safety).

During the transition period of implementing hybrid learning, especially in the Mathematics Education program at Universitas Indraprasta PGRI, efforts need to be made to assess the students' digital literacy skills in applying hybrid learning. This is necessary to provide input for the institution to prepare the students' knowledge, understanding, and skills so that the implementation of hybrid learning can facilitate the students' learning and their adaptation to and smooth participation in hybrid learning.

Method

The research uses a survey method, with descriptive statistical analysis techniques. The sample was 35 students of Mathematics Education, FMIPA, Indraprasta PGRI University, taken using purposive sampling technique. Data collection used a digital literacy questionnaire modified from the Kominfo digital literacy instrument (2020), with indicators: information and data literacy, critical thinking, using technology, communicating, and digital security. The modified questionnaire consists of 25 statement items using a Likert scale. The modified instrument was then tested on 20 students, to determine the validity and reliability of the instrument. The results of the validity test of instrument items from 25 instrument items obtained 23 valid statement items, and 2 items were declared dropped analyzed using SPSS were as follows in Table 1.

Table 1. Item Validity Test Results

Item Number	Correlation	Status
V1.1	0.75	Valid
V1.2	0.68	Valid
V3.3	0.76	Valid
V3.4	0.71	Valid
V1.5	0.67	Valid

Item Number	Correlation	Status
V1.6	0.69	Valid
V2.7	0.69	Valid
V2.8	0.77	Valid
V2.9	0.65	Valid
V1.10	0.72	Valid
V1.11	0.72	Valid
V3.12	0.82	Valid
V3.13	0.61	Valid
V3.14	0.74	Valid
V3.15	0.66	Valid
V3.16	0.60	Valid
V3.17	0.26	Drop
V4.18	0.63	Valid
V4.19	0.74	Valid
V4.20	0.56	Valid
V5.21	0.60	Valid
V3.22	0.29	Drop
V5.23	0.75	Valid
V3.24	0.77	Valid
V5.25	0.73	Valid

The following is the distribution of the number of instrument items for each digital literacy dimension as presented in Table 2.

Table 2. Instrument Item Distribution

Dimensions	Number of items before testing	Number of items after testing
Information and Data Literacy	6	6
Critical thinking	3	3
Using technology	10	8
Communicate	3	3
Security	3	3
Amount	25	23

The results of the instrument reliability test obtained a fairly high reliability coefficient, namely 0.96. Thus, digital literacy instruments can be used to collect data on student digital literacy abilities from predetermined respondents.

The data was processed using a descriptive statistical approach such as mean and percentage, then analyzed using a narrative descriptive approach, to obtain a map of students' digital literacy abilities, and a map of potential trends in students' digital literacy abilities in each dimension. This capability overview map was carried out to prepare and anticipate opportunities and challenges in implementing hybrid learning.

Result and Discussion

Following are the results of the average ability scores in each dimension compared to the total digital literacy ability scores as presented in Table 3.

Table 3. Average of Student Digital Literacy

Dimension	Average Score
Informations and Data Literacy	21.83
Critical Thinking	10.61
Using Technology	30.00
Communication	11.03
Security (e-safety)	10.21

Digital literacy skills, as shown in the table above, for information and data literacy indicators reached an average of 21.83 of the total score. Critical thinking ability 10.61 of the total score. The ability to use technology is 30.00. Communication skills obtained an average of 11.03, and abilities in digital security or protection amounted to 10.21. So the total digital literacy ability of students is 82.83. The distribution of students' digital literacy abilities is as presented in the following graph in Figure 1.

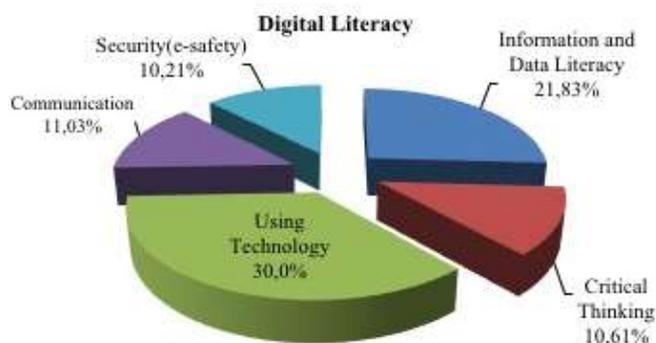


Figure 1. Percentages of digital literacy

The graph above shows a map of digital literacy abilities based on digital literacy dimension groups, where the tendency for digital literacy capabilities is the ability to use technology, followed by the ability to search for information and data literacy, communication skills, critical thinking skills, and digital security skills (e-safety). The results of data analysis can also determine the average score of students' digital literacy abilities based on each dimension. This is done to determine the trend map of students' digital literacy capabilities as can be seen in Table 4.

The average score for digital literacy capabilities in the information and data literacy dimensions is 25.11, critical thinking skills 12.20, ability to use technology 34.51, and communication skills 12.68, and ability in digital security (e-safety) is 11.74. The table above shows that in information skills and data literacy the average dimension score reached 83.71, the average critical thinking ability dimension score was 81.33, the average score for the ability to use technology was 86.28, and the average score for communication skills was 84.57, and the average ability in digital security (e-safety) reached 78.27. Based on these results, it is known that the highest average score is in the ability to use technology, while the lowest average ability is in digital security (e-safety) abilities. The average score of these dimensions describes a map of students' digital literacy abilities in implementing hybrid learning, especially in the Mathematics Education Study Program, FMIPA, Indraprasta PGRI University, but is not a generalization. Map of students' digital literacy abilities as presented in Figure 2.

Table 4. Average Dimensions Score Student Digital Literacy

Dimensions	Sum of Item	Maximal Score	Respondent Average Score	Dimensions Average Score
Informations and Data literacy	6	30	25.11	83.71
Critical thinking	3	15	12.20	81.33
Using technology	8	40	34.51	86.28
Communication	3	15	12.68	84.57
Security (e-safety)	3	15	11.74	78.27

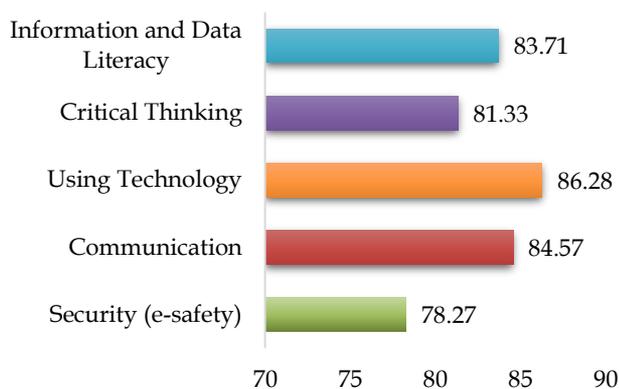


Figure 2. Digital literacy capability map

The map of digital literacy skills in the image above shows that the potential of students' abilities in using technology, information and data literacy, and communication skills are opportunities for implementing hybrid learning to continue to be developed with the aim of facilitating student learning and of course improving the quality and quality of learning. Meanwhile, critical thinking skills and digital security are challenges in implementing hybrid learning so that attention should be given to awareness, empowerment and development of students' digital literacy capabilities.

Digital literacy on implementing hybrid learning as the teaching and learning about technology and its use

is focused narrowly on the technical and information aspects of technology (Ng, 2015). Hybrid learning integrated online resources and activities with face-to-face contexts (Huang et al., 2019). Students' digital literacy capabilities are described based on digital literacy dimensions which include the ability to search for information and data literacy, think critically, use technology, communicate, and digital security (e-safety).

Information and Data Literacy

Digital literacy in the dimensions of information and data literacy shows that students' abilities are 25.11% of the total digital literacy score. Meanwhile, based on the total dimension score, the student's ability reached 83.71%. The score shows fairly high digital literacy skills for information literacy and data literacy. Digital information literacy is the ability to identify information needs, find the location of information and how to access information, use information, evaluate information, synthesize information, and understand issues surrounding the use of information through information and communication technology (Oktaviana, 2022). Information literacy can be utilized optimally if it is supported by technological literacy (Fatmawati & Safitri, 2020). The process of searching for quality information and using it as a manifestation in writing and in solving problems is a form of information literacy (Irhandayaningsih, 2021). Information skills consist of searching for information, using information and fluently using information technology (Prasetyo & Hadi, 2020). Digital literacy practices, such as evaluating information found online, the focus group interviews suggested variable capabilities across the group, with an awareness yet limited grasp of how online information could be evaluated (Ahmed & Roche, 2021).

Research findings state that students are able to search for and retrieve information efficiently and effectively through printed books, online books and online journals, and can evaluate the information they obtain (Gani et al., 2020). Ability required to be smart in choosing and sorting information during search needed so that users do not have difficulties in the process of independently searching for information (Fitriani et al., 2023). Implementation of hybrid learning is an effective step to maintain the quality of knowledge transfer (Haetami, 2023).

Critical Thinking

Digital literacy in the critical thinking dimension shows that students' abilities are 12.20% of the total digital literacy score. Meanwhile, based on the total dimension score, the critical thinking ability of new students reached 81.33%. The critical thinking process in the context of digital literacy is the skill to select and evaluate the information obtained from digital sources

(Arjaya et al., 2023). The learning process really requires a critical selection process from various sources of information to obtain accurate information (Ririen & Daryanes, 2022). Critical thinking: the ability to use reasoning skills to engage with digital media and its content as well as question, analyze and evaluate (Naufal, 2021). The cognitive dimension of digital literacy relates to the ability to think critically in the cycle of searching, evaluating, and creating processes for digital information (Xu et al., 2023). Usage of digital literacy in critically evaluating information, online interaction and online tools and managing, and communicating information & collaboration and share of digital contents (Abbas et al., 2019).

Using Technology

Digital literacy in the dimension of ability to use technology shows that students' abilities are 34.51% of the total digital literacy score. Meanwhile, based on the total dimension score, the critical thinking ability of new students reached 86.28%. Digital literacy is one type of literacy among various types of literacy advancements that arise from technological developments and advances (Kurniawan et al., 2023). Skills in using technology are needed to overcome all problems that exist in the era of easy information (Mawarni et al., 2021). Digital literacy includes many things, namely not only skills in utilizing technology but also in applying it to teaching activities for students (Bakhri et al., 2023). The intensity of using digital technology can influence their ability to search for and select information (Nugroho & Nasionalita, 2020). Students have basic internet skills, they are able to find and retrieve information from the internet, and use it effectively (Nahdi & Jatisunda, 2020). Apart from internet skills, the ability to use technology in terms of using various applications, platforms, learning management systems, including the Google Meet application and Zoom meetings. The Zoom application is used to facilitate hybrid learning. By using zoom, both students in the classroom and zoom can see the questions, quiz score, leaderboard, and podium simultaneously (Pathoni et al., 2023). Its mean that digital literacy means more than just having the technical skills to operate digital devices properly (Arvianto et al., 2023).

Communication

Digital literacy in the communication dimension shows that students' abilities are 12.68% of the total digital literacy score. Meanwhile, based on the total dimension score, the critical thinking ability of new students reached 84.57%. This shows that students have good abilities in communicating in digital spaces (Jamil et al., 2022). In aspect of effective communication, most

students are used to obtaining information through digital technology (Sofian et al., 2023). Students can understand what is learned and trained to produce creative ideas and communicate these ideas in the learning process (Utaminingsih et al., 2023). Communication consisted the skills to discuss and share topic or materials, to use different types of digital tools, and to participate as an active student during class (Nurbaya, 2023). Communicating information properly in its context (audience and media) in ICT environments (Reichert et al., 2020). In the context of establishing digital communication, digital literacy skills can be used to facilitate learning activities by providing suggestions, input and narratives related to specific learning topics (Lukitasari et al., 2022).

Security (e-safety)

Digital literacy in digital security dimensions (*e-safety*) shows student abilities amounting to 11.74% of the total digital literacy score. Meanwhile, based on the total dimension score, the critical thinking ability of new students reached 78.27%. Digital safety is the ability of students to maintain the security of personal data when doing activities in the digital space (Natsir et al., 2022). The important role of educators in maintaining students' internet safety in using digital technology (Manik, 2022). The findings of student digital literacy are very good in the e-safety dimension, security when opening websites or the internet, and maintaining the confidentiality of personal data on social media (Sianipar et al., 2023). The level of awareness regarding digital safety in terms of device protection competence, personal data protection and privacy, health and welfare protection and environmental protection is quite good (Ardiansyah et al., 2021). Safety and security, such as copyright awareness and fostering a healthy digital environment, are crucial for responsible digital citizenship (Park, 2023). Digital safety include manage online privacy and safety and manage digital identity (Cosby et al., 2023).

Students' ability to use technology and the ability to search for information and data literacy as well as other supporting abilities are opportunities for successful implementation of hybrid learning in higher education. Digital literacy skills is one solution in responding to the challenges of technological progress (Dewi, 2022). The challenges of hybrid learning in higher education include independent learning, as research results shows. The higher a person's digital literacy, the higher the strength of a person's independent learning ability (Rohmah et al., 2022). Independent learning activities carried out by students in finding teaching materials used in teaching and learning activities in higher education (Febianti et al., 2023). Multimedia-based or computerbased methods can increase digital literacy

(Nuryanti et al., 2023). Digital literacy is using digital learning tools, managing learning platform, using advanced digital learning tools, security & ethics (Kim, 2019).

Research finding showed that the application of hybrid learning benefited the lecturers and also the students in some aspects; one of them is the students' improvement in grammar achievement and their digital literacy (Vonti & Rahmah, 2019). Students report using social media in their higher education learning, showing that students value social media for collaboration, discussion, information finding and sharing, and practice activities related to their learning (Smith & Storrs, 2023).

Conclusion

The map depiction of students' digital literacy abilities based on the dimensions of ability to use technology, information and data literacy skills, communication skills, and critical thinking skills, shows trends in the chances of successful implementation of hybrid learning. The implementation of hybrid learning is still in the transition stage, namely the ability to utilize technology, literacy and data information. Thus, based on the map of students' digital literacy abilities, it can be concluded that students' digital literacy abilities need to be improved to answer the opportunities and challenges of implementing hybrid learning.

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Conflicts of Interest

The authors declare no conflict of interest.

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