



Digital Literacy, Academic Self-Efficacy, and Student Engagement: Its Impact on Student Academic Performance in Hybrid Learning

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Abstract: Hybrid learning is a learning design approach that has been widely used by educational institutions by combining face-to-face learning components and technology-based learning pedagogy. In practice, hybrid learning demands to produce the same quality of academic achievement as face-to-face learning, so it requires special attention from lecturers to create meaningful learning experiences for students. This study specifically aims to analyze and evaluate academic performance in hybrid learning by exploring several factors, such as digital literacy, academic efficacy, and student engagement. This research was followed by 107 pre-service teacher students who participated in hybrid teaching spread across four different provincial regions. The data collection instrument used was a questionnaire, and academic achievement was measured through a Grade Point Average (GPA). The data analysis used in this study was path analysis. The results of this study reveal that student involvement is an important factor that affects academic achievement. In addition, digital literacy and academic self-efficacy indirectly affect academic performance through increased active social-emotional involvement of students in synchronous and asynchronous learning designs.

Keywords: digital literacy, student engagement, academic performance, hybrid learning

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INTRODUCTION

The spread of the COVID-19 pandemic as a global disaster has an impact on the economic and health sectors and a significant impact on the field of education at all levels (Quezada et al., 2020). Changes in the curriculum are a response to an effort to accommodate student learning needs in hybrid learning (Suresh et al., 2022). Adjustment in learning changes that integrate technology is certainly a problem in itself. Preparing educators to get used to technology-based learning is a longstanding problem and a more challenging emergency learning during the pandemic (Shinas & Wen, 2022). In response to this uncertain situation, universities are given the flexibility to adapt according to the adaptability of technology in their learning (Jung et al., 2021; Morley & Clarke, 2020). Distance learning is an emergency learning mode widely applied in universities to minimize the loss of learning time for students (Kalloo et al., 2020). Some students like online learning because of its flexibility but do not know that online and face-to-face learning must achieve the same compatibility (Romero-Hall & Jaramillo Cherez, 2022).

This emergency curriculum change makes hybrid learning the new normal in the world of schooling (Khalili, 2020). As well as social restrictions due to the pandemic outbreak that has not yet ended, it also requires the conversion of the entire college curriculum into a form of hybrid learning (Jones et al., 2020). Learning by utilizing the digital environment depends on student access to resources, communication styles, learning styles, and technological readiness (Damast et al., 2021). On the other hand, students also experience many problems in learning, such as the low quality of internet access (Dinh & Nguyen, 2020) and the problem of geographical location differences that are obstacles to learning (Aydin, 2021; Ullah & Ali, 2021; Ma et al., 2021). Problems in emergency learning during the pandemic faced by lecturers and students, if explored properly, will be an opportunity, especially in creating innovative technology-based learning (Adedoyin & Soykan, 2020).

In a learning environment that integrates technology, the digital literacy factor in learning is an important element to facilitate students' learning. Digital literacy is one of the 21st-century skills that must be possessed by an educator in carrying out his role and function (Greaves et al., 2012; Güneş & Bahçivan, 2018). Technology integration in learning is not only limited to technology but also to pedagogical efforts in learning students (Duttdoner et al., 2012). Building communication relationships between educators and students in an online learning environment is mandatory (Carr, 2016). The conception of digital literacy has four profiles: technology focus, reading focus, goal-focused, and reflecting proportional use (List et al., 2020). Educators with digital competence are defined as individuals with competence in information literacy, data, communication, security, problem-solving, and productivity (Reisoğlu & Çebi, 2022). Instefjord and Munthe (2016) explain that teachers' digital competence consists of three areas of knowledge: technological proficiency, pedagogical compatibility, and social awareness.

Improving digital competence for teachers is an important thing to do in a very rapid technological development era (Yoon, 2022). A good digital literacy will directly affect the intention to use digital technology for learning (Jang et al., 2021). Digital literacy development efforts are interpreted as a development of self-competence driven by technology (Tomczyk, 2020). It is important to design a training program aimed at developing students' digital literacy (García-Martín & García-Sánchez, 2017; Porat et al., 2018; Zimmer & Matthews, 2022), but in its development, it is also necessary to pay attention to the negative impact of excessive internet use (Helsper & Smahel, 2020; Purnama et al., 2021). Blau et al. (2020) highlight the importance of self-regulation and learning new technologies as an integral part of digital literacy. Self-regulation in internet use will make students wiser in using internet access for self-development and competency development. Higher education institutions should be able to facilitate their students in developing digital literacy through various supporting resources in digital-based teaching (Wu et al., 2020).

The implications of learning the two forms of synchronous and asynchronous learning alternately in hybrid learning, including self-ability in certain academic achievements, is important to note. This is because students are required to have relatively high learning independence compared to face-to-face learning. A person's confidence in his ability to complete academic tasks is further defined as self-efficacy (Bandura, 1977). The level of self-efficacy is manifested in the form of perseverance or individual tenacity in participating in all learning activities to achieve academic goals to be achieved. In the digital era like today, technological disruption such as the phenomenon of smartphone/gadget addiction can also interfere with student concentration in learning if it is intended not according to its function. Cultivating academic self-efficacy can reduce smartphone addiction patterns and indirectly impact academic performance (Soland, 2019; Zhou et al., 2022).

Academic self-efficacy, the belief that one can achieve desired academic goals, plays an important role in learning activities (Adams et al., 2020). High-confident students tend to succeed in their studies (Hitches et al., 2022). Increased academic self-efficacy can facilitate academic progress and educational success and minimize the risk of dropping out of school (Peguero & Shaffer, 2015). Cheng et al. (2019) explain that three strong predictors affect student academic self-efficacy: commitment, influence control, and challenge. If students can manage their academic self-efficacy well, it will positively impact their future career development (Zeng et al., 2022). So, as educators who teach in hybrid learning, it is necessary to have a strategy to build student self-efficacy academically to impact student learning success.

The transition period or change from face-to-face learning patterns to online or blended learning causes many problems, including decreased academic performance. The issue of declining academic performance in online learning during the pandemic has been highlighted by researchers and academics (Hashemi, 2021). Excessive use of smartphones in learning also contributes to declining student academic performance (Lin & Zhou, 2022). Excessive use of smartphones will reduce student involvement in learning, both synchronous and asynchronous, lack of teacher and student communication intensity, and lack of interaction between students. If students' seating position in face-to-face learning can determine academic performance (Chan et al., 2022), this differs from blended learning, which can be carried out inside and outside the classroom. Another factor affecting student success in online learning is the presence factor, both synchronous and asynchronous (Kaushik et al., 2021).

Active involvement of students in learning can reduce student learning difficulties in an online learning environment (Avci & Ergün, 2022). Student involvement and readiness in the learning process positively affect their academic performance (Germain-Rutherford et al., 2021; Salimi et al., 2022). Involvement in learning can be initiated by motivating students (Singh et al., 2022) and increasing interaction between educators and education participants (Zeinstra et al., 2023). Efforts to increase the motivation and intensity of communication between lecturers and students are important because, in online learning, sometimes students tend to feel alone. Educators need to carry out all forms of intervention in learning to encourage students to be actively involved in learning (Okwuduba et al., 2022). Discussion activities online through videoconferencing platforms will generate more active involvement and can prevent multi-tasking activities that interfere with synchronous learning (Hutain & Michinov, 2022). Learning independence and the ability to evaluate oneself independently is also important to knowing learning progress, and this has an impact on achieving the desired learning goals (Yan et al., 2021).

Several studies related to digital literacy have been conducted, such as the importance of digital literacy for instructors in learning (Romero-Hall & Jaramillo Cherez, 2022), e-learning experience (Tomczyk, 2020), digital literacy among students (McGarr & McDonagh, 2021; Morgan et al., 2022), parental digital literacy (Barnes & Potter, 2021), and digital literacy development through mobile devices (Churchill, 2020). Research on academic self-efficacy in academic performance has been conducted such as Dixon et al. (2020), Dogan (2015), Museus et al. (2021), Qamar et al. (2017), and Zysberg and Schwabsky (2021). Further, Deng et al. (2021) state that academic self-efficacy affects career development in the future. Meanwhile, research on student engagement related to academic performance has also been carried out such as Adams et al. (2020), Anokye Effah and Nkwantabisa (2022), Dogan (2015), Eakman et al. (2019), Fokkens-Bruinsma et al. (2021),

Harris et al. (2017), Hopwood et al. (2021), Kunka (2020), Matizirofa et al. (2021), Wang and Neihart (2015), engagement and disengagement (Chiu, 2021), and factors affecting student engagement (Kurt et al., 2022). Meanwhile, Instefford and Munthe (2016) state that digital competence is still not considered an important competency in the professional competence of a teacher. What was missed in several previous studies was looking at the relationship between digital literacy and academic performance, especially in blended learning patterns. Overcoming gaps from some previous literature, this study aims to see the relationship between digital literacy, student engagement, and academic performance. This study seeks to examine how the importance of digital literacy can impact student engagement and academic performance in hybrid learning.

METHODS

The method in this study was quantitative research with a survey research design. Quantitative research allows researchers to obtain or collect data by statistical analysis derived from samples through predetermined instruments (Creswell, 2012). A survey research design is a quantitative research procedure to describe an object from the population obtained through a research sample. It used questionnaires as a basic instrument in data collection. The population in this study was pre-service teacher students, with a total of 301 who participated in hybrid learning at the Faculty of Teacher Training and Education in four (4) provincial regions. The sampling technique used was purposive random sampling of 107 students. The sampling criteria were pre-service teacher students who took part in Hybrid learning in as many as seven universities with the distribution of regional provinces as follows:

Table 1. Data distribution

Province	Amount of Sample
DKI Jakarta	28
Banten	27
Jawa Tengah	26
Lampung	26
Total	107

The data in this study was quantitative data obtained through the distribution of questionnaires and student learning outcomes sheets/GPA. A research instrument is a tool researchers use to measure or describe a particular variable under study. The instrument used in this study is a questionnaire. The variable measurement dimension of digital literacy consisted of 5 statements considering the research by Carretero et al. (2017). The measurement dimension of the academic self-efficacy variable consisted of 8 statements concerning (Bandura, 1977; Bandura, 2006; Pajares, 2007). The dimension of student engagement measurement referred to the survey instrument theory, according to Burch et al. (2015). The measurement scale for digital literacy, academic self-efficacy, and student engagement variables used the Likert scale (1-5). Meanwhile, the academic performance variable, according to Brugiavini et al. (2020) was measured through Cumulative Performance Index (GPA) data. Based on some of the literature above, the instrument indicator in this study is as follows:

Table 2. Instrument Indicator

Variable	Indicator
Digital Literacy	Information and data literacy Communication and Collaboration Digital Content creation Safety Problem-solving
Academic Self-Efficacy	Magnitude Generality Strength
Student Engagement	Emotional Engagement Physical Engagement Cognitive Engagement: In class Cognitive Engagement: out of class
Academic Performance	Indeks Prestasi Kumulatif (IPK)

The process of collecting data in this study was by using questionnaires, observation sheets, and student cumulative achievement index data. Research instruments are tools used to collect data to measure the variables studied (Lavasani & Khandan, 2011). The questionnaire used in this study was equipped with filling instructions to make it easier for respondents. Each answer from the questionnaire filled out obtained a different score

(Marantika, 2022). The data in this study was analyzed through path analysis in AMOS software version 24.

RESULT AND DISCUSSION

The relationship model of path analysis made refers to literature and previous research studies, including digital literacy student engagement (Ellwein et al., 2014; Matizirofa et al., 2021; Tare et al., 2022), academic self-efficacy student engagement (Adams et al., 2020; Shin & Bolkan, 2021; Wu et al., 2020), digital literacy academic performance (Fan, 2022; Kenton & Blummer, 2010; Pagani et al., 2016), self-efficacy academic performance (Alhadabi & Karpinski, 2020; Eakman et al., 2019; Harris et al., 2017), and student engagement academic performance (Anokye Effah & Nkwantabisa, 2022; Azzali et al., 2022; Lowe & Kadi, 2022). Based on the literature, the visualization of the path analysis model is presented in Figure 1 below:

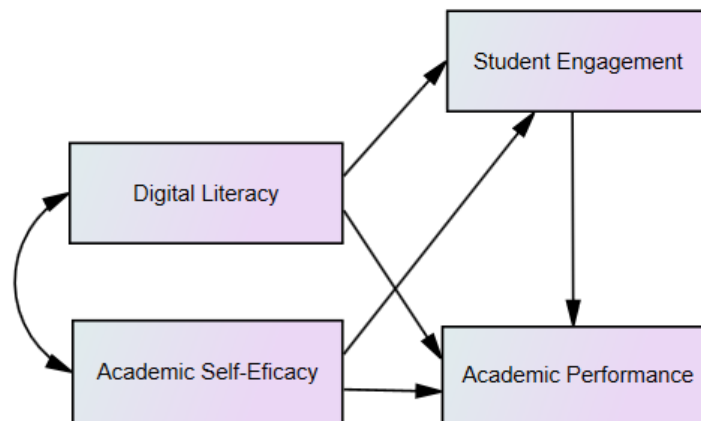


Figure 1. Model Path Analysis

Figure 1 of the path analysis model describes that the exogenous variables in this study consist of digital literacy and academic self-efficacy. In contrast, the endogenous variables consist of student engagement and academic performance. Referring to the model, path analysis was carried out using Amos 22 software to determine the relationship between variables directly and indirectly as follows:

Direct Effect between variables

Direct analysis describes the regression or correlation of relationships between variables partially in an analysis model presented in the table as follows:

Table 3. Direct Effect

Variable	Path Coefficient	Standard Error	P	Result
Digital literacy → Student Engagement	1,397	,333	***	Significant
Academic self-efficacy → Student Engagement	1,139	,213	***	Significant
Digital literacy → academic performance	,009	,012	,459	Insignificant
Academic self-efficacy → academic performance	,002	,018	,763	Insignificant
Student engagement → academic performance	,956	,043	,013	Significant

Noted:

*** (<0.0001)

P Value > 0.05 (significant)

Based on Table 1 above, according to the significance test criteria in the path analysis, if the P value < 0.05, it is declared significant. We can see that the digital literacy variable affects the student engagement variable significantly, indicated by the path coefficient value of 1.937 and the P *** value (<0.0001). The academic self-efficacy variable directly affects student engagement significantly, indicated by the path coefficient value of 1.139 and the P *** value (<0.0001). Thus, it can be interpreted that digital literacy and student engagement positively and significantly influence student engagement in the hybrid learning model.

On the other hand, the digital literacy variable has an insignificant effect on student academic performance, indicated by a path coefficient of 0.009 with a P value of 0.459 > 0.05. The same is true for the academic self-efficacy variable, which has an insignificant effect on academic performance with a path coefficient of 0.002 and a P value of 0.763 > 0.05. So, it can be understood that digital literacy and student engagement in this study directly do not significantly affect student academic performance in the hybrid learning pattern. While the student engagement variable has a significant influence on academic performance with a path

coefficient value of 0.956 and a P value of $0.013 < 0.05$.

Indirect influence between variables

To determine the indirect influence of the relationship between exogenous variables consisting of digital literacy and academic self-efficacy, as well as their effect on academic performance through student engagement variables, a Sobel test was conducted, with results as in Table 4 below:

Table 4. Indirect Effect

Indirect Effect		Z Sobel	Result
Digital literacy → student engagement → Academic Performance	1,335532	4.12244485	Significant Indirect Effect
Academic self-efficacy → student engagement academic performance	1,088884	5.19914478	Significant Indirect Effect

Noted: Sobel's Z value > 1.96 , then the relationship is declared significant

Based on Table 2 above, it can be seen that digital literacy and academic self-efficacy indirectly affect student academic performance in hybrid learning through student engagement. The value of Z Sobel shows this in the digital literacy variable on academic performance through student engagement of $4.12244485 > 1.96$. The academic self-efficacy variable indirectly also significantly affects academic performance through student engagement, shown by a Z sobel value of $5.19914478 > 1.96$. Based on the exposure to the data above, it can be interpreted that in hybrid learning, an important element that needs to be considered is the student engagement aspect. Digital literacy and academic self-efficacy factors are also important for educators to create a good learning atmosphere that has implications for good academic performance.

The problem of declining student academic achievement in hybrid learning during the pandemic has become a concern for many parties. According to [Di Malta et al. \(2022\)](#) and [Hashemi \(2021\)](#), there has been a decline in academic achievement during learning during the pandemic. Hybrid learning allows the learning environment to occur synchronously and asynchronously ([Hapke et al., 2021](#)) and requires good student time management ([Hsu et al., 2023](#)). During the emergency learning period, universities are free to apply online and offline learning regulations according to student learning conditions and needs ([Cliff & Assiouras, 2022](#)). Effective learning processes are demonstrated by changes in aspects of individual knowledge, attitudes, skills, and actions ([Das et al., 2022](#)). Many researchers and academics question the quality of hybrid and face-to-face learning and whether it can produce the same output, and it is too early to assume that online learning is the only alternative to face-to-face teaching ([Osman, 2020](#)).

In hybrid learning, this study finds that student engagement is an important factor affecting academic achievement, expressed by a path coefficient value of 0.956 and a P value of $0.013 < 0.05$. This also aligns with the research findings of [Anokye Effah & Nkwantabisa \(2022\)](#), [Azzali et al. \(2022\)](#), [Balwant \(2022\)](#), [Lowe and Kadi \(2022\)](#), and [Stuart et al. \(2022\)](#). As in face-to-face learning, creating a learning environment that actively involves students in the learning process is an important factor that needs to be presented in the hybrid learning process. Furthermore, [Sun et al. \(2023\)](#) explain that student performance in hybrid learning is better than face-to-face learning using AR/VR technology. On the other hand, in this study, digital literature and academic self-efficacy factors do not directly affect students' academic achievement. This statement contradicts the study results of [Afzal and Crawford \(2022\)](#), which state that students with good digital literacy often have higher academic achievement.

Digital literacy is a basic skill that prospective educators must possess in using the latest technological devices, making it easier for students to understand learning. It is known that advances in information and communication technology have had an impact on the abundance of digital information resources in society. Digital technology and digital literacy are key factors in transforming digital-based education and learning services ([Okoye et al., 2023](#)). An important thing for educators is how to manage or utilize digital learning resources to benefit the completion of student learning tasks. In addition to good digital literacy skills, student involvement in a hybrid learning environment also needs attention. The findings in this study state that digital literacy has a positive and significant effect on student engagement with a P value of < 0.0000 ; this is in line with research by [Ellwein et al. \(2014\)](#) and [Matizirofa et al. \(2021\)](#). These findings demonstrate the importance of digital literacy to increase students' active engagement in learning. Meanwhile, [Tare et al. \(2022\)](#) state that in the completion of student learning tasks, more difficult questions or tasks will have an impact on greater involvement in the completion of learning tasks. So, in hybrid learning, educators need to pay attention to the difficulty level of the tasks given to students. On the other hand, the advantages of online learning environments allow for more cognitive student involvement in digital skills development and independent learning ([Chiu,](#)

2021).

Another factor that deserves the attention of educators in blended learning is academic self-efficacy. Student confidence in their ability to achieve the desired academic goals plays an important role in learning activities (Adams et al., 2020) or further in completing education. Student perceptions of the difficulty of a course's assignment will impact student behaviour throughout learning activities. Students tend to do tasks they feel capable of doing and will avoid a task perceived beyond their ability. The results of this study stated that there was a positive and significant relationship between academic self-efficacy and student engagement, which was stated with a P value of < 0.000 ; this is in line with research (Tomás et al., 2020). This explains that the higher the academic self-efficacy of students, the higher their student engagement and vice versa. In hybrid learning, students are required to be able to participate in learning actively, enthusiastically ask various questions, be excited, and have a high interest in learning. Students who have good academic efficacy will have the potential to improve their academic performance (Yu et al., 2022).

While related to academic self-efficacy, the findings in this study align with the statement of Salimi et al. (2022) that increasing academic self-efficacy has no significant effect on improving academic performance. Students are growing and developing in an all-digital social environment, so they are believed to develop their digital competencies naturally. Porat et al. (2018) find that most students have high confidence in their digital literacy, but this is inversely proportional to their very low level of academic performance; this level of confidence is related to the academic self-efficacy of a student. An individual's confidence and confidence in his or her ability to complete academic tasks is an important factor in learning activities (Lei et al., 2022). Interestingly, this study finds that academic self-efficacy does not directly affect hybrid learning. This means that someone who has confidence in his ability to complete academic tasks does not necessarily impact his academic performance without being supported by the social-emotional environment in his learning environment. Nevertheless, academic self-efficacy is important in the psychological development of students as well as can prevent them from dropping out of school (Supervía et al., 2022).

On the other hand, student engagement moderates the variables of digital literacy and academic self-efficacy; this is expressed by the Z sobel values of 4.12244485 and 5.19914478. This means that digital literacy and academic self-efficacy influence academic performance through student engagement, although digital literacy and academic self-efficacy do not affect academic performance directly. The results of this study illustrate that in hybrid learning, student engagement is a success factor in improving student academic performance supported by digital literacy and good academic self-efficiency. This statement aligns with the research of Johnson et al. (2018) that student engagement is a prerequisite for success in learning activities. So, it can be understood that student involvement in social and emotional will impact improving academic performance (Delfino, 2019).

Blended learning as a combination of two learning patterns, namely synchronous and asynchronous, is undoubtedly the future direction of academic learning in the integration and globalization of education (Pham & Ho, 2020), and in the long term, it is predicted that many learning practices will be carried out in a hybrid manner (Lundberg & Stigmar, 2022). Even compared to the average academic grades and satisfaction, asynchronous learning has lower academic satisfaction and performance than synchronous learning (Stuart et al., 2022). The main challenges in implementing hybrid learning include knowledge of low technology use, low teacher digital literacy, internet facilities, and a conducive learning environment (Kruszewska et al., 2022; Roy et al., 2021). Meanwhile, Galindo-Domínguez and Bezanilla (2021) reveal that some prospective teachers only have intermediate digital competencies and some difficulties developing content in learning using technology. So, pre-service teachers should be trained in information and data literacy, communication, collaboration, digital content creation, security, and problem-solving (Reisoğlu & Çebi, 2020).

CONCLUSION

Adapting hybrid learning modes in learning practices requires special attention to several factors that can make learning more effective. Differences in perspectives and methods in student learning styles, teaching styles with face-to-face learning, and technology integration in learning need to be studied further. This study analyzes factors that affect student academic performance in hybrid learning, which concludes that one of the important factors that affect academic performance is student engagement. Efforts to improve student academic performance can be made by increasing student involvement socio-emotionally in the learning process, both in synchronous and asynchronous learning; on the other hand, digital literacy factors and academic self-efficacy are also important to be created by educators to be able to bridge between student digital literacy and individual trust in the completion of their academic assignments, so that it can increase student engagement which in turn will also have an impact on student academic performance. The results of this study can then be used as a guideline for educators in implementing hybrid learning. However, this study has not qualitatively revealed factors that affect academic performance that can provide knowledge in improving the implementation of hybrid

learning.

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