

# **THE EFFECT OF DIGITAL LITERACY SKILLS AND LEARNING MOTIVATION ON THE EFFECTIVENESS OF DISTANCE LEARNING (A PERCEPTION-BASED STUDY OF STUDENTS AT THE FACULTY OF SCIENCE AND TECHNOLOGY, UNIVERSITAS TERBUKA)**

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## **Abstract**

The digital transformation in higher education has established distance learning as a primary model in open institutions such as Universitas Terbuka. However, its implementation still faces various challenges, particularly due to differences in individuals' abilities to access and utilize technology, as well as in maintaining self-directed learning motivation. While most previous studies have focused on technical and infrastructural aspects, research examining internal student factors, such as digital literacy and learning motivation, remains limited and rarely explored in an integrated and comprehensive manner. This study aims to analyze the effect of digital literacy and learning motivation on the effectiveness of distance learning, based on the perceptions of students at the Faculty of Science and Technology, Universitas Terbuka. A quantitative approach was employed using a descriptive-verify method, with data collected through questionnaires and analyzed using multiple linear regression with STATA application. The findings indicate that both digital literacy and learning motivation have a positive and significant effect on the effectiveness of distance learning, with learning motivation contributing more dominantly. These results highlight the importance of developing digital competencies in balance with strengthening psychological factors to ensure distance learning can be more effective and sustainable in open higher education environments.

**Keywords:** Digital literacy, learning motivation, learning effectiveness, distance learning

## **1 INTRODUCTION**

The advancement of digital technology has brought significant changes to the landscape of higher education. As an open and distance learning institution in Indonesia, Universitas Terbuka (UT) has adopted online learning as the primary model for educational delivery. This transformation allows for wider, more flexible, and inclusive access to education. Nevertheless, the effectiveness of distance learning is invariably tied to various technical and non-technical challenges. One of the primary obstacles is the varied levels of student's digital literacy skills as well as their diverse levels of learning motivation.

Digital literacy encompasses the skills required to use technological devices, critically access and evaluate information, and responsibly utilize digital media. Research by Riswanti et al. (2022) indicates that student's digital literacy is influenced by internal factors such as curiosity, self-determination, and prior technology experience. Similarly, a study by Akbar (2023) found that digital literacy has a positive effect on student's learning processes, despite the variation in proficiency levels among students. Furthermore, Abbas and Marwa (2023) emphasize that digital literacy is a key 21st-century skill that students must possess to compete in the Society 5.0 era.

Learning motivation is a crucial factor in the context of distance learning, where students are required to engage in self-directed learning without direct supervision from instructors. A study by Fitriyani et al. (2023) showed that student's learning motivation during online learning was generally in the good category, covering aspects such as concentration, enthusiasm, curiosity, and learning persistence. A similar study by Nasrah and Muafiah (2022) indicated that learning motivation has a significant relationship with online learning outcomes. More recent research by Khaq et al. (2025) also confirmed that online learning has a positive influence on student's motivation, although not all students could adapt well due to technical or environmental constraints.

To date, much of the research has primarily focused on the technical and infrastructural aspects of distance learning, such as platform readiness, network quality, and facility support. Meanwhile, studies concerning student's internal factors, specifically those that integrate digital literacy and learning motivation toward educational effectiveness, remain limited and rarely conducted comprehensively. Therefore, this study is essential to thoroughly analyze how digital literacy skills and learning motivation affect the effectiveness of distance learning among students in the Faculty of Science and Technology at Universitas Terbuka. The findings are expected to contribute to the development of more effective learning strategies by balancing the enhancement of student's digital competence with the strengthening of their psychological aspects.

## **2 METHODOLOGY**

This study employed a quantitative approach using a descriptive-verificative method. The research population consisted of students enrolled in the Faculty of Science and Technology at Universitas Terbuka (UT) who were participating in distance learning courses during the current 2025 academic year. Due to constraints in time and research funding, the sample

selection was conducted using a purposive sampling technique. This involved selecting respondents who met specific criteria: they had to be active students of the UT Faculty of Science and Technology and had participated in an online tutorial (Tuton) or distance learning for a minimum of one semester. A total of 176 respondents completed and returned the online questionnaire, and this number was used as the research sample, which is considered sufficiently representative.

Primary data were collected via questionnaires utilizing a 5-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The instrument was developed based on the following indicators (Table 1):

Table 1. Operationalization of Variables

Variables	Indicators
Digital Literacy (X <sub>1</sub> )	Ability to Operate Digital Devices Ability to Access Online Learning Platforms Ability to Search for Academic Information Effectively Ability to Evaluate Information Validity Ability to Use Supporting Learning Applications Ability to Create Digital Content Awareness of Data Privacy and Security Resistance to Hoaxes and False Information
Learning Motivation (X <sub>2</sub> )	Orientation towards Academic Goals Persistence in Learning Intrinsic Satisfaction in Learning Planning and Setting Learning Targets Autonomy in Attending Lectures/Courses Sense of Responsibility for Learning Outcomes
Distance Learning Effectiveness (Y)	Mastery of Subject Material Flexibility of Time and Place Improvement in Learning Progress Autonomy in Completing Assignments Quality of Academic Interaction General Perception of D-Learning Effectiveness

Mathematically, the research model can be formulated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e$$

where:

Y = Distance Learning Effectiveness

X<sub>1</sub> = Digital Literacy

X<sub>2</sub> = Learning Motivation

β<sub>0</sub> = Constant

$\beta_1, \beta_2$  = Regression Coefficients

$e$  = Error Term

The data were analyzed using Multiple Linear Regression Analysis to determine the influence of digital literacy and learning motivation on distance learning effectiveness, employing the STATA software package as the analytical tool. Prior to conducting the regression analysis, classical assumption tests were performed, which included the tests for normality, multicollinearity, and heteroscedasticity. Furthermore, a partial test (t-test) was conducted to examine the individual effect of each independent variable, as well as a simultaneous test (F-test) to examine the joint effect of the independent variables on the dependent variable.

### 3 FINDINGS AND DISCUSSION

This study involved 176 respondents from various students academic programs within the Faculty of Science and Technology at Universitas Terbuka (UT), who are geographically dispersed across several UT Regional Offices (UT Daerah). The respondents' characteristics are quite diverse, spanning age, semester of study, and residential location (both urban and rural areas). This diversity highlights that the UT distance learning system is accessed by students with varied backgrounds and circumstances, particularly concerning internet access, device ownership, and their daily learning environments.

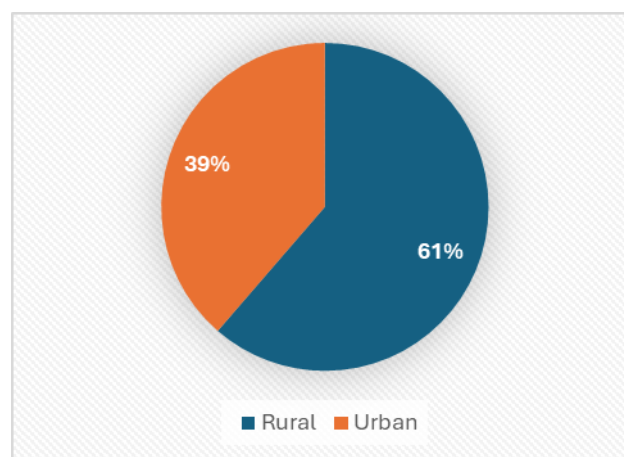


Figure 1. Distribution of Respondents' Residential Locations

Based on Figure 1, it is evident that the majority of respondents reside in rural areas (61%), while the remaining 39% live in urban areas. This condition confirms that UT students originate not only from major city centers but also from rural regions, which typically possess more varied accessibility. The high proportion of students residing in rural areas also illustrates that the UT distance learning system is successfully reaching communities outside of urban centers.

In terms of accessibility, Figure 2 demonstrates that the majority of students (83%) reported having private internet access at home. Conversely, the remaining 17% of respondents do not have private internet access and still rely on public facilities, such as internet cafes, public Wi-Fi, or specific institutional networks. This disparity in access has direct implications for the student's smooth participation in online lectures.

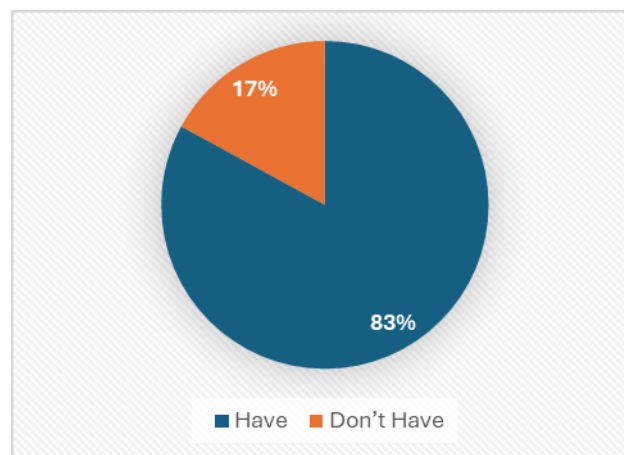


Figure 2. Distribution of Respondents Based on Private Home Internet Access

Upon closer examination, students residing in urban areas generally possess more stable internet access compared to those in rural areas. This disparity is primarily influenced by the availability of network infrastructure and the quality of internet service in each region. Conversely, students in rural areas often encounter constraints such as limited signal strength, additional costs for internet access, and reliance on public facilities. This variation in conditions is a crucial factor that can influence the effectiveness of distance learning at UT, particularly concerning the consistency of online attendance, engagement in forums, and the speed of accessing course materials.

The study by Jovanka et al. (2023) on the determinants of e-learning service usage at Universitas Terbuka found that ease of internet access is a critical factor influencing the intensity and intention of using e-learning platforms. Thus, the difference in access between urban and rural regions has implications for the level of utilization of online education services. Furthermore, UNICEF (2020), through a national field study on digital learning, highlighted the existence of an infrastructure and digital skills gap between regions, which affects the equity of online learning quality across various parts of Indonesia.

Table 2. Multiple Linear Regression Analysis Results

Variable	Coefficient	Std. Error	t	Sig. (p-value)
Constant	.186966	.1946964	2.05	0.042
Digital Literacy (X <sub>1</sub> )	.1571764	.0767041	9.51	0.000
Learning Motivation (X <sub>2</sub> )	.7116589	.0748132	0.96	0.338
F	190.68			
Prob > F	0.0000			
R-Squared	0.6879			
Adj R-Squared	0.6843			
Root MSE	.4424			

Based on the multiple linear regression analysis results presented in Table 2 the following regression equation is derived:

$$Y = 0,186966 + 0,1571764X_1 + 0,7116589X_2$$

The results of the multiple linear regression analysis indicate that Distance Learning Effectiveness (Y) is positively influenced by both Digital Literacy (X<sub>1</sub>) and Learning Motivation (X<sub>2</sub>). The regression coefficient for Digital Literacy is 0.157. This suggests that every one-unit increase in digital literacy will lead to an increase of 0.157 units in distance learning effectiveness, assuming all other variables remain constant (*ceteris paribus*). This finding aligns with the theory that digital literacy is an essential prerequisite for technology-based learning processes (Gilster, 1997). Students who possess the skills to access, comprehend, and utilize digital technology are better equipped to follow online lectures, interact in learning forums, and optimally utilize online learning resources. Research by Azizah et al. (2025) further shows that digital literacy plays a critical role in supporting distance learning effectiveness, especially when accompanied by factors like technological accessibility.

Furthermore, the regression coefficient for Learning Motivation is 0.712. This indicates that every one-unit increase in learning motivation results in an increase of 0.712 units in distance learning effectiveness. Learning Motivation exerts a substantially greater influence on distance learning effectiveness compared to digital literacy, as evidenced by its significantly higher regression coefficient (0.712 versus 0.157). This suggests that even when students possess adequate technology access and digital literacy, learning effectiveness will not be achieved without the internal impetus of motivation. This conclusion is consistent with the

Self-Determination Theory by Deci & Ryan (1985), which posits that intrinsic and extrinsic motivation are key factors determining student success in achieving learning goals. A study by Hartnett (2016) also demonstrates that learning motivation plays a significant role in supporting student's active participation and success within online learning systems.

The results of the t-test show that the Digital Literacy ( $X_1$ ) variable has a t-statistic of 2.05, which is greater than the t-critical value of 1.65361. This indicates that Digital Literacy has a positive and significant influence on Distance Learning Effectiveness. In other words, a higher level of student's digital literacy corresponds to a higher level of achievable distance learning effectiveness. Furthermore, the Learning Motivation ( $X_2$ ) variable yields a t-statistic of 9.51, which is also substantially larger than the t-critical value (1.65361). This finding asserts that Learning Motivation has a positive and highly significant influence on distance learning effectiveness. It highlights that learning motivation is the dominant factor in enhancing student success in distance learning.

The F-test results show an F-statistic of 190.68 with a p-value of 0.000 ( $<0.05$ ). This signifies that Digital Literacy and Learning Motivation simultaneously have a significant influence on distance learning effectiveness. Consequently, the regression model used is deemed appropriate and valid for explaining the relationship between the independent and dependent variables in this study. This confirms that learning effectiveness is determined not only by technical aspects (digital literacy) but also by student's psychological aspects (learning motivation). Simply put, distance learning is more effective when students possess both good digital literacy and high learning motivation.

The Coefficient of Determination ( $R^2$ ) value of 0.6879 indicates that 68.79% of the variation in distance learning effectiveness can be explained simultaneously by digital literacy and learning motivation. The remaining 31.21% is influenced by other factors not included in the model. Meanwhile, the Adjusted  $R^2$  value of 0.6843 confirms that the regression model used has a good level of fit in explaining the relationship among the variables.

Digital literacy serves as a critical foundation for students to effectively access, manage, and evaluate online learning resources. Zahroh & Sholeh (2023) investigated the effectiveness of digital literacy in supporting online learning during the pandemic and concluded that digital literacy is an essential element for ensuring that the digital learning process meets its established objectives. The majority of students demonstrate adequate proficiency in using devices and online learning platforms. They are capable of utilizing supportive academic

applications such as Word, Excel, and Google Drive, and are accustomed to accessing information through the internet. This reflects that FST UT students are generally technologically prepared for online learning. However, there is a tendency for the skill of creating digital content (e.g., presentations or multimedia products) to remain sub-optimal among some respondents. This suggests that student's skills are stronger in the aspect of usage rather than digital productivity.

From the perspective of learning motivation, FST UT students generally exhibit a high internal drive. They possess a strong desire to complete their studies on time, experience satisfaction upon successfully grasping the material, and strive to be responsible for their learning outcomes. Nevertheless, consistency in setting daily or weekly learning targets remains a challenge. This is understandable given that distance learning demands a high level of self-regulated learning, a skill not all students adapt to quickly. Recent research (Arrafii, Sumarsono, & Suadiyatno, 2025; Lubis, 2024) indicates that despite high internal motivation, self-regulated learning aspects—such as planning daily/weekly targets, monitoring progress, and reflection—are still a genuine challenge. Unstructured learning strategies and a lack of external routine often impede consistency.

In terms of distance learning effectiveness, the majority of students rate distance learning as quite effective due to the flexibility it offers. Students can study anytime, anywhere, and complete assignments autonomously. As demonstrated in Haruji Satianugraha's study (2024), flexibility in choosing study time and location receives a highly positive response. However, this flexibility is often accompanied by complaints regarding variability in internet signals, home disturbances, and the need for higher self-discipline to maintain productivity.

A recurring weakness is found in the aspect of interaction with lecturers and tutors. Limited academic interaction often creates the impression that students are studying in isolation, which potentially reduces motivation for some individuals. Research by Artanti et al. (2025) and Amin et al. (2022) indicates that active lecturer-student interaction (prompt feedback, direct discussion, two-way communication) is vital for maintaining motivation. Without sufficient interaction, students feel they are learning alone, which can subsequently diminish their internal drive.

Strengthening digital literacy is a crucial aspect for enhancing distance learning effectiveness. Higher education institutions must not only ensure students can use basic applications but also equip them with digital productivity skills, such as creating interactive presentations,



managing online learning platforms, and producing multimedia content. These efforts will transition students from being passive users to individuals capable of leveraging technology creatively and productively to support their academic process.

Furthermore, the development of learning motivation is a determining factor for distance learning success. Learning strategies that integrate gamification, prompt feedback, and peer-to-peer collaboration can boost student engagement and prevent boredom. Distance learning effectiveness will be further optimized when managed with a holistic approach that combines technical, pedagogical, and psychological aspects in a balanced manner. The synergy of these three aspects is believed to be capable of creating a distance learning ecosystem that is more inclusive, effective, and sustainable.

#### **4 CONCLUSION**

The findings of this study demonstrate that the effectiveness of distance learning at Universitas Terbuka (UT) is determined by a combination of student's digital literacy and learning motivation. Students with high digital literacy and strong learning motivation tend to more easily realize the benefits of distance learning flexibility, access materials effectively, and complete assignments autonomously. Conversely, students facing limited internet access, low digital skills, or weak learning motivation encounter significantly more obstacles. The regression analysis results prove that both variables significantly influence distance learning effectiveness, contributing 68.79% of the variance, with learning motivation being the most dominant factor. This finding confirms that the success of distance learning is influenced not only by technology availability but also by student's psychological factors, discipline, and learning management skills.

Based on these results, Universitas Terbuka, particularly the Faculty of Science and Technology, needs to focus on strengthening two main aspects. First, enhancing digital literacy, this should be achieved through continuous training to ensure students transition from being passive technology users to becoming productive in leveraging technology. Second, strengthening learning motivation, this requires employing interactive learning strategies, providing prompt feedback, and organizing collaborative activities to maintain student engagement. Furthermore, attention must be given to supporting technological accessibility, especially for students in rural areas, and improving academic interaction with tutors to prevent the perception of learning in isolation.

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