

Profile of digital literacy of mathematics education students in online learning and its relationship with learning motivation

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ABSTRACT

This study aims to determine the digital literacy profile of Mathematics Education students at Universitas Negeri Makassar in online learning and its relationship with learning motivation. The research was designed with a quantitative approach ex-post facto model with the main method of survey. The research was conducted on Mathematics Education students at Universitas Negeri Makassar. The result of the studies: (1) mathematics education students have a high level of digital literacy, (2) mathematics education students have a high level of learning motivation, and (3) the relationship between digital literacy and learning motivation has a linear relationship and strong correlation between digital literacy and learning motivation.

Keywords: Digital literacy, mathematics education students, online learning, leaning motivation

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1. Introduction

COVID-19 became a pandemic and a "health disaster" hit various countries in early 2020 [1]. As a result of the spread of COVID-19, WHO announced this incident as a serious health problem and the governments of various countries and especially Indonesia announced plans to limit distances and limit the movement of people known as Large-Scale Social Restrictions (PSBB) or PKMM. With this distance restriction, it also has an impact on the organization of higher education [2]. The Minister of Education and Culture of Republic of Indonesia issued the letter to prevention of COVID-19 in Education with changing all learning activities in School to online learning. Online learning is a face-to-face learning process without physical interaction between teachers and students (virtual learning) or known as learning from home [3].

In addition, it is also currently in the Industrial Revolution 4.0 era, which is an era of using modern tools to help solve human problems [4]. Therefore, learning from home is supported by the times.

The kind of development the information technology in education is E-Learning [5]. E-Learning is a learning innovation that has a major contribution to teaching and learning process, transformation from manual to digital learning both visually and non-visually and interactively [6][7]. E-Learning is expected to make learners more motivated so that it can generate interest in engaging in teaching and learning process.

In various references, it is explained that online learning has many conveniences in the learning process. However, despite the convenience, some teachers and students struggle to maintain quality and motivation in the teaching and learning process of online learning [8].

In connection with this description, the aim of the study is to determine the digital literacy profile of Mathematics Education students at Universitas Negeri Makassar in online learning and its relationship with learning motivation.

2. Literature Review

2.1. Digital Literation

Digital literacy consists of two words: "literacy" and "digital". According to the online Indonesian dictionary, literacy is (1) the ability to write and read; (2) knowledge or skills in a specific field or activity (computer); (3) an individual's ability to process information and knowledge for life skills; digital is related to numbers for the specific calculation system; it is related to numbering; and digital literacy is the ability to the ability to understand computer-based information.

Noh states that the literacy concept must change as the develops of ICT, and previous research has shown that the evaluation criteria are evolving [9].

Pangrazio, Godhe, & Ledesma said that digital literacy is the understanding and use of information in various formats from different sources as presented through a computer [10]. Furthermore, Huerta and Sandoval-Almazn said that digital literacy variously known as internet literacy, online literacy, cyber literacy, multimedia literacy, and information literacy [11].

2.2. Digital Literacy in Online Learning

Pre-Industrial Revolution 4.0, digital literacy has been predicted by various practitioners to be an important and vital foundation in the future development of education [12]. Evidently, the Industrial Revolution 4.0 era changed the learning paradigm which was initially carried out conventionally then carried out blended learning or a combination of synchronous and asynchronous learning.

Online learning has been one of the main option in the learning process in the time of COVID-19 [13]. This is done in accordance with the information of the Ministry of Education and Culture of the Republic of Indonesia which instructs that learning is carried out online in order to prevent the spread of COVID-19 at the time of the learning process.

The "learning from home" program and the "freedom to learn" program launched by the Ministry of Education and Culture of the Republic of Indonesia make digital literacy is an important part of the teaching and learning process. The "freedom to learn" program aims to give teachers and students the innovate freedom and freedom to learn independently and creatively [14].

3. Research method

This study is an expost facto research with a survey method conducted to obtain profile of mathematics students' digital literacy in relation to learning motivation. The research activities began with the study of various literatures, documents, research results.

The population and sample of this study were Mathematics Education students at Universitas Negeri Makassar. The data analysis used is descriptive analysis with a quantitative approach that produces effectiveness criteria from quantitative data of research instruments. The data description analysis in this study is intended to describe and define the profile of the digital literacy level of mathematics education students in relation to learning motivation. And also, Pearson correlation analysis was conducted to analyze the correlation between digital literacy and learning motivation using R software.

For categorizing the level of digital literacy and learning motivation based on Type II of Benchmark Assessment (PAP) with 4 categories [15]. In the variables of digital literacy and learning motivation, the lowest score is set at 1 and the highest score is 4 for each variable category. The formula for PAP Type II is as follows.

$$\text{HVP} + (\text{percentile value} \times (\text{HVP} - \text{LVP}))$$

Description:

HVP: Highest possible value

LVP: Lowest possible value

For the digital literacy level variable, the HVP value: 92 and LVP value: 23. The categorization for the digital literacy variable can be seen in Table 1.

Table 1. Digital Literacy Categories

Calculation of Lower Limit	Score Range	Category
$23 + [76\% \times (92-23)]$	75 – 92	Very High
$23 + [51\% \times (92-23)]$	58 – 74	High
$23 + [26\% \times (92-23)]$	41 – 57	Fair
$23 + [0\% \times (92-23)]$	23 – 40	Low

For the learning motivation variable, the HVP value: 56 and LVP value: 14. The categorization for the learning motivation variable can be seen in Table 2.

Table 2. Learning Motivation Categories

Calculation of Lower Limit	Score Range	Category
$14 + [76\% \times (56-14)]$	46 – 56	Very High
$14 + [51\% \times (56-14)]$	35 – 46	High
$14 + [26\% \times (56-14)]$	25 – 34	Fair
$14 + [0\% \times (56-14)]$	14 – 24	Low

4. Results and Discussion

4.1. Instrument Validity and Reliability

To determine whether the questionnaire given is in accordance with the purpose and purpose of the research, first the validity and reliability of the research questionnaire are tested. Based on the results of validity testing, it was found that all statements on the digital literacy variable were declared valid with a value of $t_{\text{count}} > t_{\text{table}}$ (1.721) for all statement items and the learning motivation variable was also valid with a value of $t_{\text{count}} > t_{\text{table}}$ (1.782), while for the reliability test the digital literacy variable was declared reliable because it had a Cronbach's alpha value = $0.892 > 0.6$, as well as for the learning motivation variable reliability test declared reliable with a Cronbach's alpha value = $0.775 > 0.6$. Based on the results of this test, it can be stated that the questionnaire can be used in this study.

4.2. Descriptive Analysis

4.2.1. Digital Literacy

Using Type II of the PAP, students' digital literacy levels can be categorized as presented in Table 3.

Table 3. Student Digital Literacy Categories

Category	Frequency	Percentage (%)
Very High	25	55.56
High	18	40.00
Fair	2	4.44
Low	0	0.00
Total	45	

Table 3 shows that the majority of mathematics education students' digital literacy level is in the very high category with a percentage of 55.56%, 40% in the high category, and there are 2 students (4.44%) who have sufficient digital literacy. Based on this, it can be said that mathematics education students have a high level of digital literacy, this is in line with the development of technology today which has entered the Industrial Revolution 4.0 [16].

4.2.2. Learning Motivation

As with the student digital literacy variable, categorization using Type II of PAP is presented in the Table 4.

Based on Table 4, it can be explained that the majority of student learning motivation is in the very high (55.56%) and high (44.44%) categories. There are no students who have sufficient and low categories. From

the results of this categorization, it can be said that mathematics education students have a high level of learning motivation.

Table 4. Learning Motivation Categories

Category	Frequency	Percentage (%)
Very High	25	55,56
High	20	44,44
Fair	0	0,00
Low	0	0,00
Total	45	

4.2.3. Cross Tabulation of Digital Literacy and Learning Motivation

Table 5. Cross Tabulation of Digital Literacy and Learning Motivation

Digital Literacy	Learning Motivation				Total
	Very High	High	Fair	Low	
Very High	18	7	0	0	25
High	7	11	0	0	18
Fair	0	2	0	0	2
Low	0	0	0	0	0
Total	25	20	0	0	45

From Table 5, it can be seen that students who have very high digital literacy also have very high learning motivation, as well as high digital literacy also has learning motivation or in other words the relationship between digital literacy and learning motivation has a linear relationship. This is in line with the opinion of Busse and Walter which states that students who have high motivation have higher learning motivation because they are able to motivate themselves to be more active and have high curiosity with digital technology in finding information [17].

Table 6. Correlation of Digital Literacy and Learning Motivation

Variable1	Variable2	Pearson Correlation	p-value	lowCI	uppCI
Digital Literacy	Learning Motivation	0.7294474	0.00000001318202	0.5546803	0.8425719

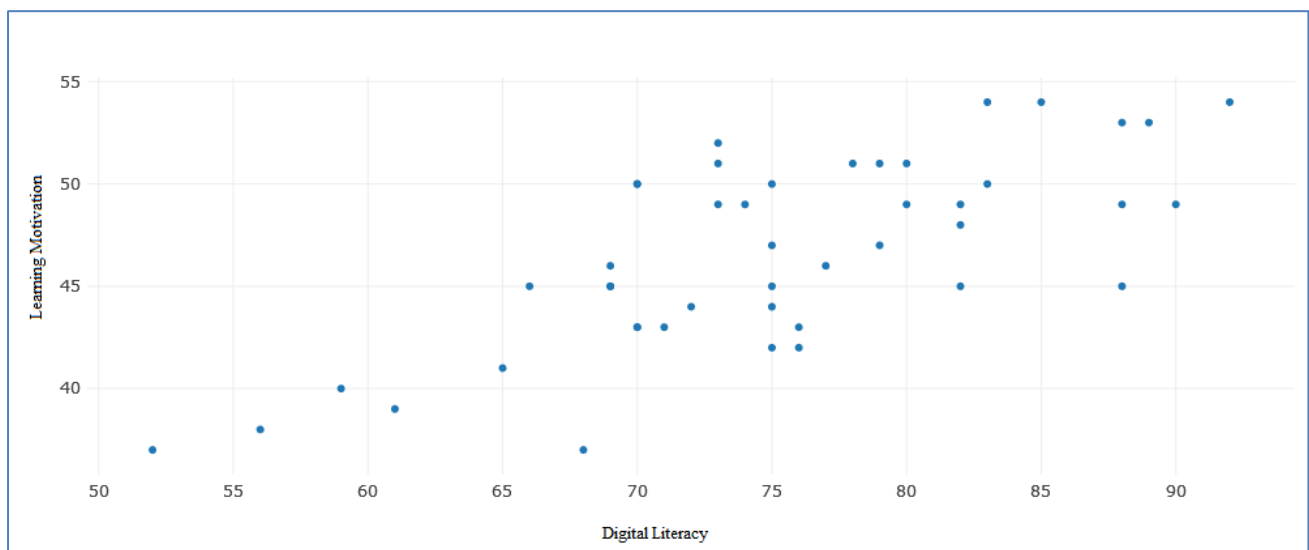


Figure 1. Scatter Plots of Digital Literacy and Learning Motivation

From the results of the Pearson correlation analysis in Table 6 and scatter plots in Figure 1, it is found that there is a significant correlation of digital literacy and learning motivation (p-value <0.01) with a correlation coefficient value of r_{pearson} was 0.7294474 that indicates a strong correlation between digital literacy and learning motivation. This supports the opinion of Wahyuni, Novitasari, Suharni, & Reswita who said that there is a positive influence of digital literacy and learning motivation [18]. This is also supported by Pala & Başbüyük who found that digital literacy and learning motivation, self-control also predicts students' academic achievement in learning [19].

5. Conclusions

Based on the results and discussion described, it can be concluded that (1) mathematics education students have a high level of digital literacy, (2) mathematics education students have a high level of learning motivation, and (3) the relationship between digital literacy and learning motivation has a linear relationship. It was also found that there is a strong positive correlation of digital literacy and students' learning motivation. For further research, it is recommended that research should also be conducted on the relationship between digital literacy, learning motivation, and student self-control in order to improve student academics in learning.

Conflict of Interest

The authors declare that they have no conflict of interest and agree to publish this paper in accordance with academic ethics.

Author Contributions

All authors contributed equally to this manuscript.

Funding

The work was supported by Universitas Negeri Makassar by the funding Hibah PNBPN Majelis Profesor on 2021, No: SP DIPA - 023.17.2.677523/2021.

Acknowledgements

The authors would like to acknowledge a research grant from Universitas Negeri Makassar for the funding support of the research project (Hibah PNBPN Majelis Profesor Tahun 2021). DIPA of Universitas Negeri Makassar, No: SP DIPA - 023.17.2.677523/2021 on 23 November 2020, In accordance with the Decree of the Rector of Universitas Negeri Makassar, 508/UN36/HK/2021 on 28 April 2021.

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