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ANALYSIS OF INDEPENDENT LEARNING AND LITERACY THROUGH AI ON THE QUALITY OF EDUCATION

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Abstract:

The aim of this research is to analyze the influence of independent learning and literacy through artificial intelligence on the quality of education. This type of research uses a quantitative descriptive approach with a sample based on purposive sampling of 236 State Middle School teachers from the Tamalanrea District area. Data collection techniques in this research were through questionnaires, literature study and observation. The data analysis technique uses Structural Equation Modeling (SEM) WarpPLS 7.0 software. The results of data analysis show that the independent learning and literacy variables have a significant effect on artificial intelligence. The variables independent of learning, literacy and artificial intelligence have a significant effect on the quality of education. The independent learning and literacy variables have a significant indirect effect through artificial intelligence on the quality of education.

Keywords: *Freedom to Learn, Literacy, Artificial Intelligence and Quality of Education*

INTRODUCTION

Since it was first launched, the Independent Learning Program has been successful in accelerating the quality of education in the country (Makarim, 2020). Through this program, the Ministry of Education, Culture, Research and Technology succeeded in strengthening various aspects of education. Starting from the curriculum, strengthening students and teaching staff (HR), to educational assistance. Independent learning is an approach taken so that students can choose the subjects they are interested in. This is done so that students can optimize their talents and make the best contribution in working for the nation. Makarim (2020) said that Merdeka Belajar is an educational development concept where all stakeholders are expected to become agents of change. These stakeholders include families, teachers, educational institutions, the industrial world and society. There are three indicators of the success of the Independent Learning program initiated by the ministry. Namely, equitable participation of students in Indonesian education, effective learning, and no students being left behind. These three indicators can be achieved, among other things, by improving educational infrastructure and technology. The classroom infrastructure of the future must be better than today. Then a technology-based national education platform must also be promoted.

Efforts to develop an independent learning system are related to literacy in learning activities (Suryadi et al, 2020). The literacy used shows a positive and significant contribution, as well as a negative and insignificant contribution to teacher creativity and the independent curriculum (Marut, 2022). Literacy has a positive and significant contribution if the literacy indicator is digital learning intensity, with a variety of digital-based reading materials, increasing knowledge with digital-themed literature and digital-based educational information to be taught to students as an actualization of

teacher creativity in an independent curriculum system (Tira et al. , 2023). Literacy has a negative and insignificant effect because literacy is not an important consideration for creative teachers in developing their potential in the current independent curriculum system (Riyanda, 2021). Literacy is a teaching and teaching material needed by teachers and students to support an effective teaching and learning process.

Freedom of learning and literacy are of course in the world of modern education, especially in teaching, which is always related to the use of educational technology (Makarim, 2020). In the increasingly competitive era, there are still educational institutions that have not implemented technology in teaching and learning activities in schools. In the current era, they must take advantage of the emergence of technology that makes the work of teachers and students easier (Tjahyanti, et al. 2022). Schools utilize applications or media that can automate tasks such as providing feedback, selecting appropriate learning materials, or aligning the curriculum with student needs. Such as Artificial Intelligence (AI) applications.

Artificial Intelligence (AI) technology continues to be developed by experts so that it can develop rapidly. H. A. Simon (2023) claims that AI is a field that allows computers to perform tasks that are superior to humans. Knight and Rich (2023) state that AI is a branch of computer science that views efforts to build computers as something that humans can do, even better than that.

The alternative role of AI is to increase human intelligence and assist humans in carrying out effective and efficient learning activities (Simon, 2023). There are various things that can be done to apply AI in learning activities (Anas et al, 2023). As times progress, demands for all fields including education to adapt and collaborate to solve problems. Application of AI in learning activities as a virtual mentor, voice assistant, smart content and presentation translator.

The now universal Internet was created as a means to spread information, knowledge, and thoughts on various topics. One program that runs alongside The Lab System, which operates more as a multimedia environment with integrated eLearning as an AI indicator, is Virtual Mentor. According to a Journal of Computer Information Systems paper, the virtual mentor feature is more useful than regular classroom instruction (Zhang, 2022). Furthermore, users can learn without having to read thanks to the voice assistant feature, a voice replacement (Simon, 2023). Reading information that activates a voice assistant will be different from human cognition processes such as absorbing information from sound. Voice Assistant is described in one example as a tool for understanding the teacher's point of view (Knight, 2023). The next application of AI, namely the Presentation Translator or presentation translator, is useful for explaining or presenting a text from a different language into the desired language (Zhang, 2022). Users only need to listen to various kinds of speech texts, articles or digital books without having to read and translate one by one (Marut, 2022).

The progress of a nation is determined by the quality of education (Anas et al, 2023). Where to get quality education, persistence is needed in managing all the components in education (Suryadi et al, 2020). The components of education include input, process and output, which must receive more attention so that quality education can be realized. Because with quality education, an intelligent generation of people will be born, making this nation more dignified (Warisno, 2021). Education quality standards are managed as a whole starting from input (all educational activities), process (implementation of each teaching and learning activity) and output (output or outstanding graduates), so that the quality of an educational institution is the quality of several services provided by an educational institution to its customers. (Salsabilah et al, 2021). This is interesting to observe to see whether independent learning and literacy activities contribute directly or indirectly to AI and the quality of education.

RESEARCH METHODS

This research uses quantitative descriptive research methods. The descriptive method is a method for explaining data by describing or illustrating the data that has been collected according to the facts, then interpreting it and making conclusions that

apply to the general public or generalizations. Quantitative methods are a type of research whose specifications are systematic, planned and clearly structured from the start until the creation of the research design (Sugiyono, 2020). The population is all State Middle School teachers in Makassar City, totaling 2,473 State Middle School teachers in Makassar City. Sampling was based on purposive sampling as many as 236 teachers in the Tamalanrea District area as respondents. In this research, the data analysis technique used is Partial Least Square (PLS) using the WarpPLS 7.0 application. Abdillah & Hartono (2020) Outer Model analysis specifies the relationship between latent variables and their indicators. The convergent validity value is the factor loading value on the latent variable with its indicators. Expected value >0.7. Inner Model analysis is used to determine the relationship between latent variables. Inner model analysis can be done using path analysis and R Square (R2) (Ghozali, 2019). Path analysis/structural path coefficient (Path Analysis), is used to find out how much influence exogenous variables have on endogenous variables. R Square (R2), coefficient of determination used to see the ability of exogenous variables to explain endogenous variables.

RESULTS AND DISCUSSION

Validity test The validity test is the degree of accuracy between the data that occurs on the research object and the power that can be reported by the researcher (Sugiyono, 2020). The validation test criteria are using factor loadings (cross-loadings factor) with a value of more than 0.50 and average variance extracted (AVE) with a value exceeding 0.50 for the convergent validity test and for the discriminant validity test using a comparison of the roots of AVE with correlation between variables. The construct AVE value should be higher than the correlation between latent variables (Sholihin & Ratmono, 2020). The results of WarpPLS 7.0 are as follows

Tabel 1. Combined Loading and Cross Loading

	X1	X2	Y	Z	Type (a	SE	P Value
X1.1	0.767	0.718	0.709	0.786	Reflect	0.070	<0.001
X1.2	0.881	0.761	0.708	0.783	Reflect	0.068	<0.001
X1.3	0.882	0.758	0.716	0.714	Reflect	0.068	<0.001
X2.1	0.847	0.890	0.784	0.778	Reflect	0.068	<0.001
X2.2	0.814	0.897	0.748	0.774	Reflect	0.068	<0.001
X2.3	0.763	0.883	0.835	0.703	Reflect	0.068	<0.001
X2.4	0.722	0.704	0.868	0.761	Reflect	0.068	<0.001
Y1	0.731	0.748	0.891	0.703	Reflect	0.068	<0.001
Y2	0.811	0.749	0.893	0.748	Reflect	0.068	<0.001
Y3	0.841	0.832	0.784	0.884	Reflect	0.068	<0.001
Y4	0.736	0.792	0.745	0.841	Reflect	0.068	<0.001
Z1	0.762	0.729	0.745	0.812	Reflect	0.068	<0.001
Z2	0.760	0.784	0.795	0.817	Reflect	0.070	<0.001
Z3	0.755	0.706	0.718	0.842	Reflect	0.068	<0.001

Source: Data processed

The WarpPLS 7.0 calculation results in table 1 show that each value of the cross-loadings factor has reached a value above 0.7 with a p value below 0.05. Thus the convergent validity test criteria have been fulfilled.

Table 2. Comparison of the Roots of AVE with Correlation between Variables

	X1	X2	Y	Z
X1	0.8566	0.0070	0.0036	0.0020
X2	0.0306	0.8586	0.0384	0.0148
Y	0.0026	0.0156	0.8534	0.0384
Z	0.0229	0.0121	0.0144	0.8475

Source: Data processed

Information can be obtained that the AVE root value for the same variable is higher than the AVE root value for a different variable. This shows that the discriminant validity test criteria have been met. Thus, the instrument used in this research has fulfilled all validity test requirements.

Reliability Test. Reliability testing is carried out with the aim of ensuring that the research instruments used can present concept measurements consistently without any bias. The results of WarpPLS data processing are as follows:

Table 3. Reliability Test

Composite Reliability Coefficients		
X1	X2	Y
Z		
0.882	0.920	0.915
0.931		

X1	X2	Y
Z		
0.797	0.869	0.861
0.911		

Source: Data processed

The basis used in the reliability test is the Composite reliability coefficients and Cronbach's alpha coefficients above 0.7. The results in table 3 show that the questionnaire instrument in this study has met the requirements for the reliability test.

Inner Model Evaluation

Calculation of Direct Influence Path Coefficients. Each path tested shows the direct and indirect influence of independent learning (X1) and literacy (X2) on AI (Y) and the quality of education (Z). The path coefficient values can be seen in the following table:

Table 4. Direct Influence Path Coefficient Values

Path Coefficients				
	X1	X2	Y	Z
Y	0.283	0.553		
Z	0.194	0.136	0.629	

P values				
	X1	X2	Y	Z
Y	<0.001	<0.001		
Z	0.008	0.047	<0.001	

Source: Data processed

Test results (path analysis) on the model and research path coefficients are as follows: *a)*. Based on the path coefficient value of 0.283 and ρ-value of 0.001, it can be concluded that there is a significant influence of independent learning (X1) on AI (Y). *b)*. Based on the path coefficient value of 0.553 and ρ-value of 0.001, it can be concluded that there is a significant influence of literacy (X2) on AI (Y). *c)*. Based on the path coefficient value of 0.194 and ρ-value of 0.008, it can be concluded that there is a significant influence of freedom of learning (X1) on the quality of education (Z). *d)*. Based on the Path coefficient value of 0.136 and ρ-value 0.047, it can be concluded that there is a significant influence of literacy (X2) on the quality of education (Z). *e)*. Based on the Path coefficient value of 0.629 and ρ-value 0.001, it can be concluded that there is a significant influence of AI (Y) on the quality of education (Z).

Calculation of Indirect Influence Path Coefficients. Indirect influence testing is

carried out by looking at the results of testing the paths taken, if all the paths taken are significant then the indirect influence is also significant, and if there are non-significant paths then the indirect influence is said to be non-significant

Table 5. Direct Influence Path Coefficient Values

Indirect effects for paths with 2 segments			
	X1	X2	Y
Z			
X1			
X2			
Y			
Z	0.178	0.347	
P values of indirect effects for paths with 2 segments			
	X1	X2	Y
Z			
X1			
X2			
Y			
Z	0.005	<0.001	

Source: Data processed

The indirect effect of independent learning (X1) on the education quality variable (Z) through the intervening variable AI (Y) is 0.178, which is smaller than the direct influence of the independent learning variable (X1) on the education quality variable (Z), which is 0.194. The indirect effect of the literacy variable (X2) on the quality of education (Z) through the intervening variable AI (Y) is 0.347, which is greater than the direct effect of the literacy variable (X2) on the education quality variable (Z), which is 0.136. Thus, it can be stated that freedom to learn (X1) influences the quality of education (Z) through AI (Y) with a smaller value than its direct influence. However, literacy (X2) influences the quality of education (Z) through AI (Y) with a value greater than its direct influence

Calculation of Total Influence Path Coefficient. The calculation of the total effect or total influence is the sum of the direct and indirect influence values. The total influence path coefficient is presented in table 6:

Tabel 6. Total Effects

Total Effects			
	X1	X2	Y
Z			
X1			
X2			
Y	0.283	0.553	
Z	0.32	0.483	0.629
P Values for Total Effects			
	X1	X2	Y
Z			
X1			
X2			
Y	<0.001	<0.001	
Z	<0.001	<0.001	<0.001

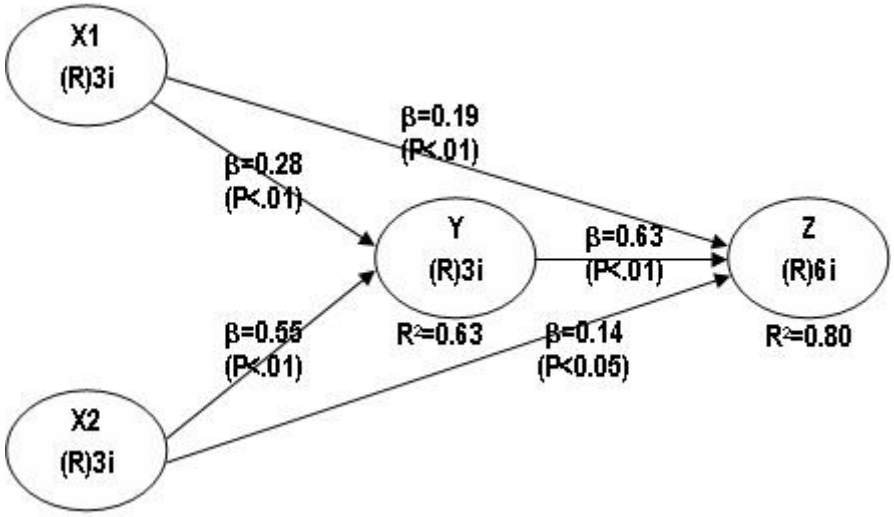
Source: Data processed

Based on the results of the path coefficient calculation, it appears that: The total

effect of independent learning (X1) on the quality of education (Z) is 0.372 with details of a direct effect of 0.194 and an indirect effect of 0.718. The total effect of literacy (X2) on the quality of education (Z) is 0.483 with details of a direct effect of 0.136 and an indirect effect of 0.374. From the calculation above, the independent variable that has the strongest influence on the AI variable (Y) is the literacy variable (X2), which is 0.553. Meanwhile, the independent variable that has the strongest influence on the education quality variable (Z) is AI (Y), which is 0.629. And the independent variable that has an influence on the education quality variable (Z) through the intervening variable AI (Y) is the literacy variable (X2), which is 0.374.

Hypothesis Model In the PLS model, the AI variable can be added as an intervening variable to provide additional contributions in explaining the quality of education. Thus, the proposed hypothesis can be tested more accurately and can provide more valid results.

Figure 1. Hypothesis Model



Source: Data processed

Coefficient of Determination. The results of testing the structural model (inner model) can be seen in the R-square (R2) for each endogenous construct, the path coefficient value, t value and p value for each path relationship between constructs. The results of the analysis of the influence of freedom of learning and literacy on AI, show a coefficient of determination or R2 of 0.627, from these results it means that all independent variables (freedom of learning and literacy) have a contribution of 62.7% to the dependent variable (AI), and the remainder is 37.3% was influenced by other factors not included in the research.

The results of the analysis of the influence of freedom of learning, literacy and AI on the quality of education show a coefficient of determination or R square of 0.799, from these results it means that all independent variables (freedom of learning, literacy and AI) have a contribution of 79.9% to the dependent variable (quality of education), and the remaining 20.1% is influenced by other factors not included in the research.

CONCLUSION

Based on the research findings that have been described, it is concluded that the test results prove that independent learning and literacy, each have a positive and significant effect on AI. The test results prove that freedom of learning and literacy each have a positive and significant effect on the quality of education.

The test results also prove that AI has a positive and significant effect on the quality of education. The test results prove that there is an indirect influence from the independent learning variable on the education quality variable through the AI intervening variable whose value is smaller than the direct influence. The test results

prove the indirect influence of the literacy variable on the quality of education through the intervening variable AI whose value is greater than the direct influence.

The recommendation and acknowledgment of the results of this research is to consider the importance of developing independent learning using AI-based literacy to ensure the quality of education by introducing digitalization technology to teachers and students, by participating in lots of training in accordance with the development of modern and superior learning methods.

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