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Technology Integration in Economic Education

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Abstract

The incorporation of technology in economic education yields numerous advantages, such as enhanced accessibility, more engaging instruction, and the cultivation of data analytic competencies pertinent to the professional realm. Numerous studies address the incorporation of technology in education; nevertheless, research focusing on the integration of technology in economic education remains few. This study is to examine and elucidate the use of technology in economic education. The employed research methodology was quantitative, utilizing a sample of 142 participants, comprising lecturers and students from the 3rd, 5th, and 7th semesters of the Faculty of Economics at the University of Muhammadiyah Sukabumi. The data gathering method is a questionnaire disseminated to participants via Google Forms, while the data analysis employs multiple linear regression. The study's results indicate a substantial favorable impact of technology integration in economic education, with an influence of 67%. This research contributes by providing references in education, particularly with the incorporation of technology in economics instruction.

Keywords *integration, technology, education, economics.*

INTRODUCTION

The incorporation of technology in education has grown essential across multiple fields, including economic education. With the swift advancement of technology, particularly in digital and information domains, the education sector encounters novel difficulties and opportunities to enhance the quality of the learning process (Bower, 2017). Technology, once regarded as an external instrument, has now become an essential component of the educational system (Tarman et al., 2019). This creates opportunities for innovation in economic education that can enhance comprehension, foster interaction between educators and learners, and extend learning outside the classroom (Davies & West, 2014; Dotong et al., 2016).

The primary impetus for incorporating technology into economic education is the necessity to adapt to the evolution of the digital economy (Kecheng, 2023). In a progressively interconnected global economy, economics students are required to not only grasp classical theories but also comprehend their practical applications within the framework of contemporary technology (Bhat, 2023). This urgency compels educators to identify more effective and pertinent methods for delivering instructional content. Furthermore, the integration of technology in economic education is anticipated to bridge the widening chasm between theory and practice.

Economic education significantly influences the knowledge and competencies of students destined for employment in several economic sectors (Alghamdi & Holland, 2020). Consequently, the economic education curriculum must evolve to align with contemporary trends and requirements. The integration of technology might be regarded as a means to attain this objective. The utilization of e-learning platforms, mobile applications, and

multimedia learning aids enhances the interactivity and engagement of economic education (Harrell & Bynum, 2018). Furthermore, technology can facilitate more individualized instruction, enabling pupils to learn autonomously. Nevertheless, despite the significant potential of technology to enhance the quality of economic education, its application is not always seamless. Teachers and students have numerous problems during this integration process, including inadequate technical infrastructure, reluctance to change, and insufficient digital skills among educators (Ramorola, 2013). Conversely, despite the advantages provided by technology, the study of economics still necessitates a profound comprehension of theories and concepts for reinforcement (Atabek, 2020). Consequently, a more strategic approach is essential in the implementation of technology in economic education.

With the advancement of digital technology, several technological applications can be utilized in economic education, including e-learning platforms, mobile applications, virtual reality (VR), and the application of big data and analytics to elucidate intricate economic ideas (Donou-Adonsou, 2019). The variety of technologies creates new possibilities for developing more inventive and flexible learning methodologies (Puhringer & Bauerle, 2019). Technology-driven education facilitates remote learning, hence transcending spatial and temporal constraints (Zhu et al., 2022). Conversely, technology enables students to access diverse resources that enhance their comprehension of economics (Lin et al., 2017).

In economic education, technology can enhance learning by making it more engaging and facilitating the comprehension of economic topics through enjoyable simulations (Nelson, 2005). Gamification-based economic simulations can instruct students in macro or microeconomic theory in a practical and participatory manner, facilitating the application of learned theories in real-world scenarios. Nevertheless, amidst the potential benefits, it is crucial to acknowledge that the incorporation of technology in economic education presents obstacles that must be addressed judiciously. One aspect is the adaptation of technology to particular requirements in economics education (Bahrini & Qaffas, 2019). Although technology can facilitate the instruction of intricate economic ideas, educators must nonetheless guarantee that the learning experience is comprehensive and encompasses the requisite theoretical aspects. Consequently, the formulation of a curriculum that integrates technology must be executed meticulously to avoid compromising the quality of instruction.

Conversely, technical infrastructure presents a considerable obstacle to technology integration (Aktan et al., 2019). Not all universities or educational institutions possess sufficient access to essential technology instruments, such computers, reliable internet connections, or other auxiliary equipment. These constraints can impede the integration of technology in economic education, particularly in underdeveloped regions (Ntorukiri et al., 2022). Consequently, initiatives are required to guarantee equitable access to technology across educational institutions, enabling all students to benefit from technological integration in their learning.

Prior research (Abed, 2019; Criollo-C et al., 2021) has emphasized the advantages of technology in education, including enhanced student involvement and broader access to learning resources. Chiu's (2020) research indicates that the direct impact of technology

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utilization on learning outcomes in economic education remains constrained. Further research is essential to investigate how technology might be efficiently employed to enhance economic learning. This study seeks to examine and elucidate the function of technology in economic education, focusing on the integration of technology within this field. This project aims to uncover optimal techniques for integrating technology into the economic education curriculum and to offer insights on utilizing technology to equip students for the challenges of the future digital economy.

METHOD

This study seeks to examine and elucidate the role of technology in economic education, focusing on the integration of technology, including the problems encountered and the potential presented. The research variables included are technology integration (X1), encompassing software utilized in the learning process; education (X2), pertaining to the teaching and learning process; and economics (Y), which relates to economic material. This study employs a descriptive methodology with a quantitative approach (Wacha, 2017). This methodology was selected to get a thorough understanding of technology's impact on economic education, while also examining the experiences and viewpoints of educators and learners. This study use literature reviews, observations, and interviews as its data collecting methods (De Sordi, 2024). This study employs primary data, namely data gathered directly from respondents via interviews and questionnaires (Sekaran & Bougie, 2016). The principal data for this study was obtained via a questionnaire distributed to respondents, specifically students of the Faculty of Economics at the University of Muhammadiyah Sukabumi. The study population comprises professors and students from the Faculty of Economics in semesters 3, 5, and 7, all of whom have completed basic courses in economics, totaling 224 individuals. The research sample will be chosen using purposive sampling. Consequently, utilizing web.raosoft.com with a margin of error of 5% and a confidence level of 95%, a sample size of 142 respondents was determined. The data analysis strategy will utilize the multiple regression method.

$$Y = \alpha + \beta 1X1 + \beta 2X2 + e$$

RESULTS AND DISCUSSION

Characteristics Respondent

The survey comprised 142 respondents, including 23 lecturers and 119 students. The attributes of these responders are determined by gender and status. Table 1 delineates the characteristics of the respondents as follows:

Table 1. Characteristics Respondent

No	Information	Frequency	Percentage
1.	**Gender**		
	Man	62	43,7%
	Woman	80	56,3%
2.	**Status**		
	Lecturer	23	16,2%

Semester 3 Students	51	35,9%
Semester 5 Students	40	28,2%
Semester 7 Students	28	19,7%
Sum	**142**	**100%**

Classical Assumption Test

Normality Test

A normality test was conducted to determine if the residual data followed a normal distribution. This research employed the One-Sample Kolmogorov-Smirnov Test method on a sample of 142 data points. The outcomes of the normalcy test analysis are displayed in Table 2 below:

Table 2. One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
N	142
Asymp. Sig. (2-tailed)	.073[c]

The significance value (Asymp. Sig.) of 0.073 exceeds the significance level of 0.05, according to the test results. Consequently, the null hypothesis (H_0) asserting that the residual data adheres to a normal distribution cannot be refuted. Consequently, it can be inferred that the residual data is deemed to follow a normal distribution at a significance level of 5%.

Multicollinearity Test

Multicollinearity tests are employed to ascertain the presence of a significant linear correlation among independent variables in a regression model. Multicollinearity can render the estimate of regression parameters unstable and diminish the model's accuracy. Table 3 displays the outcomes of the multicollinearity assessment:

Table 3. Multicollinearity Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.130	1.915		.590	.556		
	Technology Integration	.748	.109	.509	6.875	.000	.433	2.311
	Education	.443	.090	.363	4.900	.000	.433	2.311

a. Dependent Variable: Economics

The table indicates that the tolerance value for the two independent variables (Integration of Technology and Education) is 0.433, which exceeds 0.10, while the VIF value is 2.311, which is less than 10. The test findings indicate that the two independent variables significantly affect the dependent variable (Economic). Furthermore, the model exhibited no

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multicollinearity issues, as evidenced by a Tolerance value beyond 0.10 and a VIF below 10.

Heterokedasticity Test

The heteroscedasticity test is employed to ascertain the presence of error variance in the constant regression model (homoscedasticity). Heteroskedasticity arises when the variance of errors varies with the value of a certain independent variable, potentially leading to inefficient model estimation. Figure 1 displays a scatterplot graph.

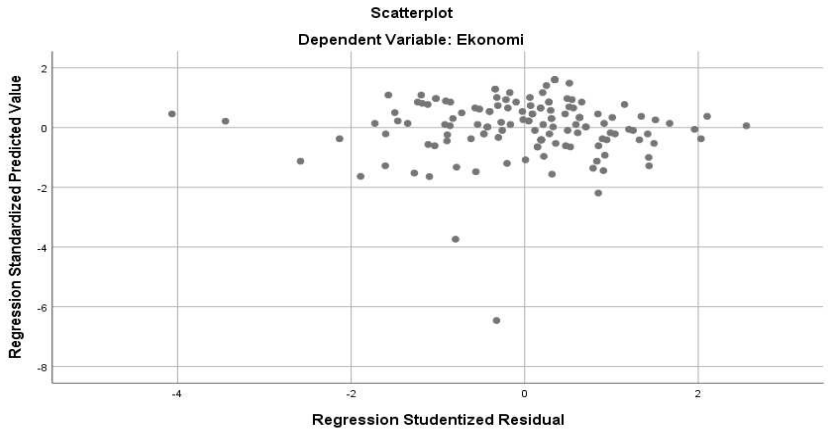

Figure 1. Scatterplot

The scatterplot illustrates that the dots are haphazardly dispersed about the X-axis, lacking a discernible pattern in the residual distribution. This point spread suggests that the residual variance remains consistent across the range of predicted values. Consequently, it may be inferred that this regression model does not demonstrate the presence of heteroscedasticity, thereby satisfying the assumption of homoscedasticity.

Hipotesis Test

Test F

The F test is a statistical method employed to compare the variances of two groups or to assess the overall significance of a regression model. The results of the F test are provided in Table 4 below:

Table 4. F Test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1999.396	2	999.698	141.037	.000[b]
	Residual	985.259	139	7.088		
	Total	2984.655	141			

The table presents the outcomes of the ANOVA (Analysis of Variance) test derived from the regression model employed to examine the correlation between independent

variables (Integration of Technology and Education) and dependent variables (Economics). The F-statistic of 141.037, exceeding 3.06, signifies that the regression model has an exceptional fit. The significance value (p-value) is 0.000, which is less than 0.05. This indicates that the regression model is collectively significant in elucidating the dependent variable (Economic).

Test T

The t-test is a statistical procedure employed to compare the means of one or two data groups, particularly when the sample size is rather small. This test is frequently employed to evaluate hypotheses on population parameters derived from sample data. The results of the t-test are reported in Table 5 below:

Table 5. Test t

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.130	1.915		.590	.556		
	Technology Integration	.748	.109	.509	6.875	.000	.433	2.311
	Education	.443	.090	.363	4.900	.000	.433	2.311

a. Dependent Variable: Economics

The table above elucidates the outcomes of the multiple linear regression analysis, utilizing the Economic dependent variable alongside two independent variables: Technology Integration and Education. The t-test findings for each coefficient indicate that Technology Integration is 6.875, which exceeds 1.976, and Education is 4.900, which also surpasses 1.976. The significance value for the two independent variables is 0.000, demonstrating that both exert a substantial influence on the economy at a 5% significance level.

Determination Test

The Determination Test quantifies the extent to which the independent variable (X) accounts for the variation in the dependent variable (Y) inside the regression model. The Coefficient of Determination (R^2) represents this value. The findings of the determination test are provided in Table 6 below:

Table 6. Determination Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.818[a]	.670	.665	2.66237

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The "Model Summary" table indicates a R value of 0.818, demonstrating a robust and positive correlation between the independent variable (Education and Technology Integration) and the dependent variable (Economics). Thus, enhanced education and technological integration correlate with elevated economic levels. An R^2 score of 0.670 signifies that 67% of the variability in economic variables is attributable to education and technology integration. This model effectively elucidates the link among these variables. The remaining 33% was affected by factors not incorporated in the model.

Integration of Technology into the Economy

The statistical test findings indicated a t-test value of 6.875, above 1.976, and a P-value of 0.000, which is less than 0.05, demonstrating a significant impact of technology integration on economics instruction. The findings of this study align with the research conducted by Aleksandrova et al. (2019) and Kalogiannidis et al. (2022), indicating that the incorporation of technology in economics education has created new avenues for enhancing learning efficacy and teaching quality. Technology enables the utilization of many tools and platforms that enhance the educational experience, augment interaction between lecturers and students at Muhammadiyah Sukabumi University, and provide access to a broader array of materials.

Education on Economics

The statistical test yielded a t-test value of 4.900, exceeding 1.976, with a significance level indicated by a P-value of 0.000, which is less than 0.05. This indicates a substantial impact of lecturers' education on the teaching of economics to students. The findings of this study align with the research conducted by Benos and Zotou (2014) and Woessmann (2016), which indicates a considerable impact of the educational process on the teaching of economics. Education plays a crucial role in influencing pedagogical methods and the dissemination of content in the domain of economics. A proficient and high-caliber educational method significantly impacts the quality of instruction, encompassing content comprehension, lecturer-student interaction, and the academic outcomes attained by students at the University of Muhammadiyah Sukabumi.

CONCLUSION

The statistical test analysis results indicated that the integration of technology in education (teaching process) significantly positively impacted the economy (economics). The integration of technology and education impacted the economy by 67%, whilst 33% was affected by other variables. The findings of this research are anticipated to benefit lecturers, students, and the University of Muhammadiyah Sukabumi, serving as a research site, and will enhance knowledge for researchers. This research advances scientific development, particularly in the incorporation of technology into economics education. This research is anticipated to influence the field of education, particularly at the secondary and higher education levels, by informing policy-making about the integration of technology in teaching methodologies. This research is anticipated to serve as a reference for other scholars

conducting similar studies on the integration of technology in economic education. Future research could enhance this study by investigating the particular technologies that most effectively facilitate economics education, such computer-based economic simulations, gamification, or mobile learning applications. Furthermore, the research can evaluate the enduring impact of technology integration on the enhancement of students' economic competencies.

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