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Original Article

The Effect of the Use of Gadgets as a Learning Resource on Economic Learning Outcomes Reviewed from the Critical Thinking of Class X Students of SMAN 107 East Jakarta

Alifia Shafa Salsabila[1*], Riswandi Riswandi[2], Aditya Pratama[3]

[1-3]Economics Education Study Program, Faculty of Economics and Business, Universitas Negeri Jakarta, Indonesia
Email: [1)] salsblalifia@gmail.com, [2)] riswandi@unj.ac.id, [3)] adityapratama@unj.ac.id

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Abstract

This study examined the influence of gadget utilization as a pedagogical resource and critical thinking on economic learning outcomes among 140 tenth-grade students at SMAN 107 East Jakarta. Grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT), the research employed a quantitative survey design. Primary data were collected via closed-ended questionnaires, while secondary data were obtained from summative assessments. Path analysis using SPSS version 25 revealed four key findings: (1) gadget use directly and positively affected learning outcomes (coefficient = 0.345); (2) critical thinking directly and positively influenced learning outcomes (coefficient = 0.520); (3) gadget use directly and positively enhanced critical thinking (coefficient = 0.527); and (4) critical thinking significantly mediated the relationship between gadget utilization and learning outcomes, with an indirect effect of 0.274 ($p < 0.05$). These results affirm that integrating gadgets as learning tools, alongside fostering critical thinking skills, substantially improves student academic performance. The study underscores the importance of technology acceptance and cognitive development in educational settings, aligning with UTAUT's emphasis on performance expectancy and facilitating conditions. Practical implications suggest that educators should strategically incorporate gadgets to promote higher-order thinking, thereby maximizing learning gains. Future research may explore additional mediating variables and broader sample populations to generalize these findings.

Keywords: Critical Thinking, Economics Learning Outcomes, Gadgets, Learning Resources, Smartphones.

1. Introduction

Schools are formal educational institutions that bear an important responsibility in nurturing students' potential through a systematic and purposive learning process, in accordance with the national educational objectives stipulated in Law No. 20 of 2003. The progressive advancement of information and communication technology has catalyzed a notable transformation in pedagogical practices, directing the landscape of learning toward digital modalities, a shift substantiated by the growing prevalence of internet access and smartphone utilization throughout Indonesia. Data from APJII (2024) indicates that the national internet penetration rate has reached 79.5%, whilst Statista (2024) notes that the number of internet users via mobile devices continues to rise, reaching 173 million users in 2024.

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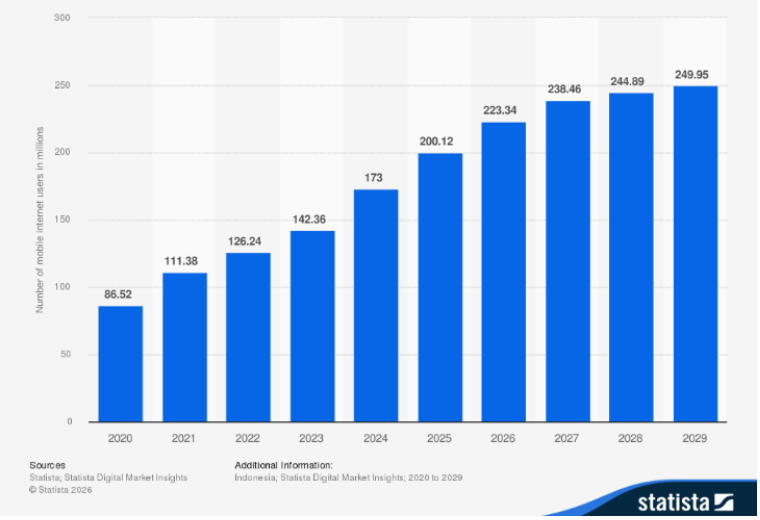

Figure 1. Number of Mobile Internet Users in Indonesia 2020-2029
Source: Statista (2024)

The evidence suggests that gadgets, particularly smartphones, possess substantial potential as learning instruments that can facilitate the educational process regardless of time and place. Nevertheless, their adoption also presents considerable challenges, given that unregulated use may disrupt students' concentration and gradually undermine their capacity for critical thinking (UNESCO, 2021). Student learning outcomes are deemed successful when they satisfy predetermined benchmarks, a standard commonly referred to as the Minimum Graduation Criteria (KKM). The ensuing data encapsulates the academic attainments of Class X students in the domain of Economics at SMAN 107 Jakarta.

Table 1. Odd Semester End Summative Assessment 2025/2026

No	Class	Number of Students	KKM	Student Completion	Incomplete Student
1.	X A	33		26	7
2.	X B	36		26	10
3.	X C	36		22	14
4.	X D	35	75	18	17
5.	X E	35		16	19
6.	X F	36		21	15
7.	X G	36		21	15
	Total	247		150	97

Source: Economics Teacher, 2025

Issues regarding learning outcomes are still evident among tenth-grade students at SMAN 107 East Jakarta. Data from the End-of-Term Summative Assessment for the first term of the 2025/2026 academic year shows that out of 247 students, 97 students (39.27%) have not yet met the Minimum Passing Criteria (KKM) set at 75. This high rate of non-achievement indicates that students' learning outcomes in economics are not yet optimal and require further study of the factors influencing them. Various studies show that learning outcomes are influenced by internal and external factors, including the use of digital technology in learning (Nur, 2025). On the other hand, the high intensity of gadget use among Indonesian adolescents is not yet fully directed towards academic purposes. Ama and Elwindra (2022) reported that the adolescents use gadgets daily for approximately 6 hours 21 minute, yet only not much utilize them for educational activities. Indeed, some studies indicate signs of gadget

addiction, which impact reduced focus, learning quality, and students' academic performance (Mardawani et al., 2024; Sarfika et al., 2024; Yusuf et al., 2024).

Over the past few years, the use of gadgets (smartphones/tablets) by students in Indonesia has increased rapidly and has become an alternative source of learning both outside and in the classroom, especially since online learning during the pandemic has encouraged the rapid adoption of digital devices in the teaching and learning process (Jamun et al., 2024). Gadgets provide easy access to various learning materials and information resources quickly, thus potentially supporting student learning activities in the digital era, including increased engagement and high-level thinking skills if used in a targeted manner in an academic context (Kim et al., 2020).

Contemporary gadgets have transcended their conventional role as mere communication instruments, evolving into multifaceted pedagogical conduits that furnish an array of interactive learning media, encompassing e-books, instructional videos, quiz applications, and digital learning platforms. The assimilation of gadgets into the scholastic process affords students the capacity to retrieve information with remarkable breadth and depth, thereby consolidating conceptual comprehension and engendering a heightened propensity for academic motivation (Ramadhina et al., 2023). In line with that, Madarcos et al. (2024) emphasized that the targeted use of gadgets can significantly increase students' interest and learning outcomes. Nevertheless, in the absence of judicious regulation and oversight, the utilization of gadgets may paradoxically engender deleterious consequences, including cognitive distractibility, an appreciable deterioration in academic concentration, and the insidious onset of digital dependency.

Among the principal catalysts prompting students at SMAN 107 East Jakarta to resort to gadget utilization is the provision of institutional Wi-Fi infrastructure, which facilitates unimpeded connectivity to internet networks. Predicated upon observational findings conducted by the researcher during the Teaching Practice Activity at the inaugural observation week in July 2025, encompassing three classes namely X.A (33 students), X.B (36 students), and X.C (36 students), constituting an aggregate of 105 students the smartphone emerged as the most preponderant device employed by the student cohort. In consonance with the stipulations delineated in the pedagogical contract forged between educators and students, the deployment of smartphones during instructional sessions is expressly proscribed unless explicitly sanctioned by the presiding teacher.

Within the ambit of learning activities, educators occasionally extend permission for smartphone usage to facilitate task completion, particularly during collaborative discussions or project-based endeavors. Notwithstanding, not all students exercise such privileges judiciously. Despite the ostensible designation of mobile devices for academic purposes, a discernible subset of students diverts their usage toward recreational gaming or social media perusal; a predilection that demonstrably impairs cognitive concentration, attenuates learning efficacy, and poses a tangible risk of diminishing scholastic achievement if left unmitigated. In response, educators have instituted resolute disciplinary measures, including verbal admonishment and the confiscation of mobile devices until the completion of economics instruction.

Meanwhile, critical thinking acumen constitutes an equally salient determinant of student learning outcomes. Within the paradigm of 21st-century education, students are not merely expected to attain content mastery, but are further obligated to demonstrate proficiency in analytical reasoning, evaluative judgment, and the logical resolution of complex problems (Facione, 2011). Notwithstanding these imperatives, the 2022 PISA findings reveal that the critical thinking capacities of Indonesian students remain appreciably deficient

relative to the OECD benchmark, a deficiency conspicuously manifested in the meager proportion of students attaining elevated levels of competence across the domains of mathematics, reading, and scientific literacy (OECD, 2023). Several studies show that the use of gadgets directed at learning activities can improve students' critical thinking skills and learning outcomes, while consumptive use has the potential to reduce these abilities (Hanif, 2025; Ningsih & Shanie, 2023).

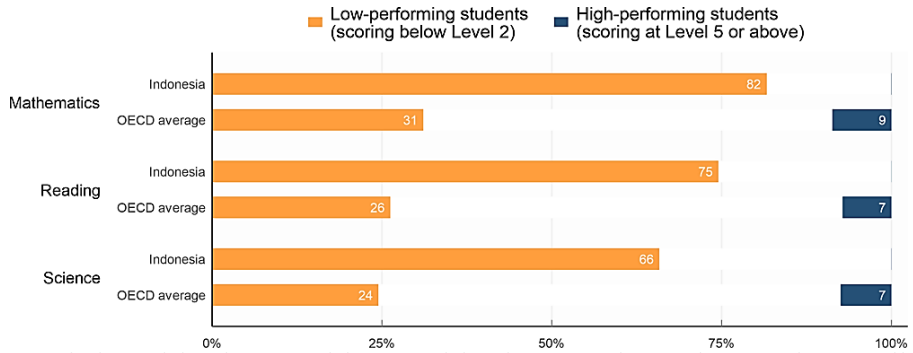

Figure 2. High-achieving and low-achieving students in math, reading, and science
Source: OECD, 2022

Deficient critical thinking proficiency constitutes one of the cardinal precipitants of attenuated conceptual comprehension and suboptimal student learning outcomes (Susanti et al., 2024). This predicament is corroborated by the 2022 Program for International Student Assessment (PISA) results illustrated in Figure 2, which unequivocally demonstrate that the scholastic achievements of Indonesian students remain considerably below the OECD mean. The data substantively indicates that the preponderance of Indonesian students subsist at a comparatively rudimentary level of cognitive capability, thereby underscoring that students' critical thinking faculties have yet to be cultivated to their full potential.

Predicated upon observational findings conducted in Class X of SMAN 107 East Jakarta, a discernible disparity in the degree of student engagement during economics instruction is readily apparent. A certain contingent of students exhibits commendable attentiveness and active participatory conduct, whereas others manifest conspicuous inattentiveness, as evinced by disruptive conversation, the unsanctioned deployment of smartphones for non-academic pursuits, or the surreptitious completion of assignments pertaining to extraneous subjects. Such conditions predispose inattentive students toward considerable difficulty in responding to academic inquiries and an evident incapacity for autonomous intellectual reasoning. Furthermore, the utilization of artificial intelligence (AI) via smartphones as an expedient mechanism for instantaneously resolving practice questions was likewise observed, a phenomenon that, whilst ostensibly efficacious in the immediacy, harbors the latent propensity to impede the cultivation of students' critical thinking and analytical competencies, owing to the conspicuous circumvention of substantive reasoning processes.

Several previous studies have examined the Effect of the use of Gadgets as a Learning Resource on Economic Learning Outcomes Reviewed from Students' Critical Thinking. Research reviewed by Jamun et al. (2024), smartphone use has a significant and beneficial effect on student achievement. This is shown by the value of the correlation coefficient of 8.4% between smartphone use and student achievement. In addition, Ramadhina et al. (2023), the use of gadgets as teaching tools directly improves student learning outcomes at SMA Muhammadiyah 11 in East Jakarta. In addition, the results of Sindiana (2022) research show that the use of gadgets with independent learning has a positive impact, both directly and

indirectly, on students' mathematics learning achievement. However, in the study of Susanti et al. (2024), cognitive learning outcomes in fifth-grade social studies at SDN 27 Kartiasa were not affected by the use of gadgets with a sig value of > 0.05. (Nikmawati et al. (2021), technology can increase students' desire to learn, but it does not have much impact on their academic achievement. These empirical findings corroborate the notion that the mere frequency and intensity of gadget utilization do not inexorably translate into ameliorated learning outcomes, particularly when such usage lacks purposeful pedagogical direction or is insufficiently accompanied by disciplined temporal management and unequivocal academic objectives. The discrepancies discerned across antecedent studies are indicative of a substantive research lacuna that the present investigation endeavors to address.

This study, undertaken under the specified conditions, principally aims to assess how gadget adoption for learning influences economic achievement, with critical thinking serving as an intervening analytical construct. The empirical focus on tenth-grade students at SMAN 107 East Jakarta was warranted by both persistently high rates of incomplete learning outcomes and the observable diversity of device usage during instruction. Given the inconsistencies found in prior research, a notable gap emerges which previous investigations have neglected to examine critical thinking as a mediating factor between gadget use and economics performance at the senior high school level. Consequently, the indirect mechanism through which device utilization affects academic results remains theoretically underdeveloped and empirically untested. The anticipated contribution of this inquiry is a more nuanced understanding of the relationships among digital tool integration, higher-order cognition, and economic learning, thereby providing a foundation for devising improved pedagogical strategies in the contemporary digital era.

2. Literature Review

2.1. Learning Outcomes

According to Dianti et al. (2024), learning outcomes are a reflection of students' authentic capabilities subsequent to undergoing the process of knowledge transmutation from educators to learners. Through the examination of such outcomes, it becomes discernible to what degree students are capable of assimilating, comprehending, and attaining mastery over the instructional material that has been imparted. Further, Gaol et al. (2022) posit that learning outcomes encompass the multifaceted transformations that transpire within students, pertaining not solely to cognitive dimensions, but equally to affective and psychomotor domains, as well as the competencies and proficiencies accrued by learners upon the culmination of instructional engagement. In the context of the present investigation, the indicators of economics learning outcomes are circumscribed to the cognitive domain, the assessment of which is derived from the Odd Semester Final Summative Examination.

2.2. Gadget Usage

As delineated by Oxford Languages, a gadget is conceived as a diminutive apparatus or implement endowed with a designated purpose or function, characteristically emblematic of contemporary technological innovation and regarded as an object of considerable novelty. Widiastuti (2023) further elucidates that the term "gadget," rooted in the English lexicon, denotes a compact electronic contrivance encompassing an assortment of specialized functions. From a morphological standpoint, the Indonesian derivative of the term, upon the affixation of the suffix -an, connotes the act of employing an instrument, harnessing its utility, or executing a task through non-coercive means (Rasdianti, 2020). The gadget specifically

referenced within the purview of this study pertains to the smartphone, a sophisticated, multifunctional electronic device of considerable computational prowess that bears substantial resemblance in capability to a conventional computer.

2.3. Learning Resources

Januszewski and Molenda (2013) assert that learning resources encompass the totality of elements that may be harnessed within the instructional process, including but not limited to messages, individuals, materials, implements, techniques, and the encompassing environment whether employed discretely or in an amalgamated fashion with the overarching purpose of facilitating pedagogical activities and augmenting learning outcomes. Consonantly, Seels and Richey (1994) expound that learning resources constitute all conceivable manifestations of instructional support, including systems, materials, and learning environments

2.4. Critical Thinking

Critical thinking, as noted by Facione (2015), entails analytical, evaluative, and inferential skills applied to relevant evidence. Fisher (2009) echoes this view, describing it as reasoned deliberation aimed at belief or behavioral decisions. It is fundamentally an active process where individuals actively participate by posing questions and searching for pertinent information, instead of passively receiving it (Fisher, 2009).

2.5. Direct Effect of Gadgets on Economics Learning Outcomes

The use of digital devices for educational purposes bears considerable potential to advance student performance in economics, largely through facilitating immediate availability of data, teaching resources, and varied online learning aids. When employed effectively, gadgets enable students to cultivate a more profound comprehension of subject matter, consequently yielding a constructive impact on their academic outcomes. Theoretical backing for this claim is furnished by the UTAUT framework, according to which perceived utility, operational simplicity, social pressures, and infrastructural support govern the integration of technology into learning processes (Venkatesh et al., 2003). Corroborating findings from Ramadhina et al. (2023) confirm that device utilization as an instructional asset exerts a favorable and meaningful influence upon learning outcomes.

2.6. Direct Effect of Critical Thinking on Economics Learning Outcomes

Critical thinking proficiency occupies a pivotal role in bolstering economics learning outcomes, insofar as it equips students with the cognitive capacity to comprehend, scrutinize, and appraise information with greater depth and discernment. Students who possess well-developed critical thinking skills tend to demonstrate a greater facility in navigating complex problems and formulating sound, well-grounded conclusions pertaining to the subject matter under study. Ennis (2011) frames critical thinking as rational reflection directed toward belief formation or behavioral choice, a view that finds empirical support in Susanti et al. (2024) who demonstrate its meaningful role in elevating student performance.

2.7. Direct Effect of Gadget Use on Critical Thinking

The use of gadgets as a learning resource can foster the development of students' critical thinking skills through activities such as searching for, comparing, and evaluating information obtained from a variety of digital sources. The more frequently students utilize gadgets appropriately in their learning activities, the greater the likelihood of developing their critical thinking skills. According to UTAUT, perceptions of benefit and ease drive technological

engagement (Venkatesh et al., 2003), a principle that finds reinforcement in Ningsih & Shanie (2023), who report a significant effect of device utilization on critical thinking proficiency.

2.8. Critical Thinking as a Mediator Between Gadget Use and Economics Learning Outcomes

An indirect pathway exists whereby device-based learning enhances economics performance through the cultivation of critical reasoning. Broader informational access empowers students to scrutinize and assess material before deploying it academically. These critical thinking skills help students understand economic material more deeply, thereby leading to improved learning outcomes. Consequently, critical thinking functions as an intervening variable that mediates the relationship between gadget utilization as a learning resource and economics learning outcomes; thus, the purposeful and effective use of gadgets holds the potential to yield a more substantial contribution to students' overall academic achievements (Venkatesh et al., 2003; Costa, 1985).

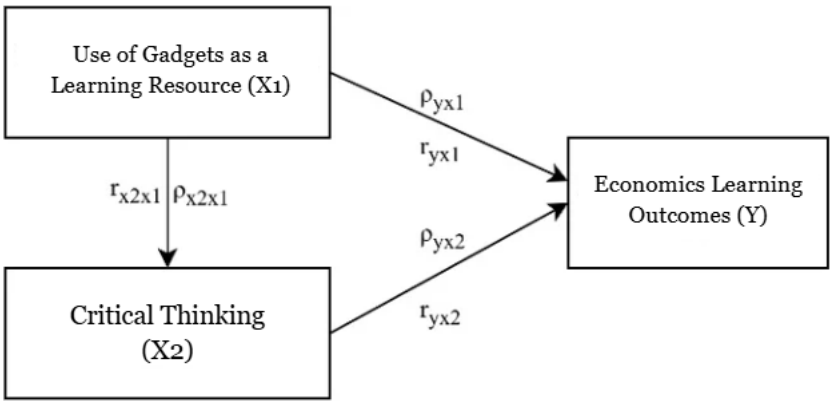

Figure 3. Conceptual Framework
Source: Data compiled by the researcher, 2025

Based on the theoretical framework outlined above, the following research hypotheses can be formulated:

A. It is hypothesized that the variable 'Use of Gadgets as a Learning Resource' has a direct positive effect on students' economics learning outcomes.
B. It is hypothesized that the variable 'Critical Thinking' has a direct positive effect on students' economics learning outcomes.
C. It is hypothesized that the variable 'Use of Gadgets as a Learning Resource' has a direct positive effect on Critical Thinking.
D. It is hypothesized that the variable 'Use of Gadgets as a Learning Resource' has an indirect effect on students' economics learning outcomes via Critical Thinking.

3. Methods

Conducted at SMAN 107 East Jakarta from July 2025 to April 2026, this investigation employed a quantitative survey design. Its objective was to assess how gadget-based learning resources affect economics achievement, while also considering the mediating contribution of critical thinking. Although Table 1 records a total of 247 tenth-grade students across seven classes, the effective study population was narrowed to 214 students following the exclusion of 33 students from classes X.A, X.B, and X.C, who had served as participants in the

researcher's preliminary observational study during the Teaching Practice Activity in July 2025 and were therefore excluded to preclude response bias. The study population comprised 214 tenth-grade students who had engaged with gadgets as a learning resource and had sat the Odd Semester End-of-Term Summative Assessment. A sample of 140 students was subsequently determined through the application of the Taro Yamane formula at a 5% margin of error, with participants selected by means of proportionate random sampling.

This investigation incorporated economic learning outcomes as the dependent variable, gadget-based learning resource use as the independent variable, and critical thinking as the mediating construct. An online Google Forms questionnaire with closed-ended Likert items supplied data for the first two variables, whereas documentation of Summative Assessment scores furnished economic outcome data. The device utilization measure contained 16 items spanning six dimensions (performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, and use behavior), and the critical thinking instrument included 12 items derived from Ennis's indicators.

Prior to their deployment in the study, both instruments underwent validity testing through the Product Moment correlation technique and reliability assessment via Cronbach's Alpha. Analysis unfolded in multiple phases, beginning with descriptive statistics to outline data properties, then advancing to assumption testing covering normality, multicollinearity, heteroscedasticity, and linearity. Hypothesis examination employed SPSS-based path analysis to determine direct and indirect variable effects, supplemented by the Sobel test to evaluate critical thinking as a mediator in the gadget-outcomes relationship.

4. Results and Discussion

4.1. Research Results

4.1.1. Instrument Test

A. Validity Test

A high validity value indicates that an instrument is valid. Meanwhile, a low validity value indicates a less valid instrument (Wati & Isroah, 2019).

Table 2. Results of the Validity Test of Gadget Instruments as Learning Sources (X1)

Code	R_{value}	R_{table}	Description
X1.1	0.759	0.344	Valid
X1.2	0.788	0.344	Valid
X1.3	0.563	0.344	Valid
X1.4_NEG	0.523	0.344	Valid
X1.5	0.618	0.344	Valid
X1.6	0.823	0.344	Valid
X1.7_NEG	0.570	0.344	Valid
X1.8	0.519	0.344	Valid
X1.9	0.519	0.344	Valid
X1.10	0.798	0.344	Valid
X1.11	0.836	0.344	Valid
X1.12	0.823	0.344	Valid
X1.13	0.759	0.344	Valid
X1.14	0.649	0.344	Valid
X1.15	0.622	0.344	Valid
X1.16	0.666	0.344	Valid

Source: SPSS Data Processing Results, 2026

All variable statements demonstrated validity, as each yielded R_{value} surpassing the critical R_{table} value of 0.344, warranting the conclusion that the questionnaire items are appropriate measurement tools.

Table 3. 1 Validity Test of Critical Thinking Instruments (X2)

Code	R_{value}	R_{table}	Description
X2.1	0.795	0.344	Valid
X2.2	0.819	0.344	Valid
X2.3_NEG	0.667	0.344	Valid
X2.4	0.661	0.344	Valid
X2.5	0.834	0.344	Valid
X2.6_NEG	0.811	0.344	Valid
X2.7	0.756	0.344	Valid
X2.8	0.764	0.344	Valid
X2.9	0.780	0.344	Valid
X2.10	0.793	0.344	Valid
X2.11	0.875	0.344	Valid
X2.12	0.800	0.344	Valid

Source: SPSS Data Processing Results, 2026

All questionnaire items were deemed valid following the validity test, with each Rvalue surpassing the critical value of 0.344, thereby establishing the instrument's adequacy for capturing research data.

B. Reliability Test

Table 4. Cronbach Alpha Reliability Test Results

Variable	Cronbach Alpha
The Use of Gadgets as a Learning Resource	0.905
Critical Thinking	0.940

Source: SPSS Data Processing Results, 2026

Reliability assessment produced Cronbach Alpha values of 0.905 for the gadget use variable and 0.940 for critical thinking, both surpassing 0.90 and thus indicating a superior degree of internal consistency.

4.1.2. Classical Assumptions Test

When using path analysis to test causal models, the data must meet the prerequisites for statistical testing, such as normality and linearity tests (Sandjojo, 2011).

A. Normality test

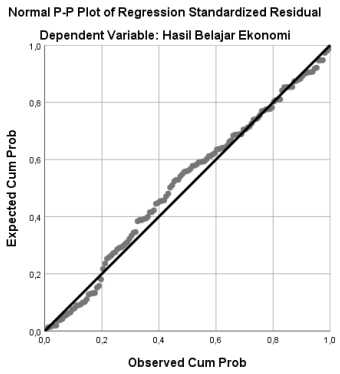

Figure 4. Graph of Normality Test Results
Source: SPSS data processing results, 2026

Figure 1 reveals that the data points cluster near the diagonal line, leading to the inference that residual values follow a normal distribution.

B. Multicollinearity Test

Multicollinearity detection among variables is accomplished through inspection of the Variance Inflation Factor (VIF) and its associated tolerance statistic.

Table 5. Multicollinearity Test

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	30.784	4.046		7.608	.000		
	The Use of Gadgets as a Learning Resource	.352	.067	.345	5.287	.000	.722	1.384
	Critical Thinking	.551	.069	.520	7.978	.000	.722	1.384

a. Dependent Variable: Economics Learning Outcomes

Source: SPSS Data Processing Results, 2026

As evidenced by the table 5 above, the tolerance value of 0.722 exceeds the threshold of 0.10 and the VIF value of 1.384 falls below the conventional ceiling of 10, thereby indicating the absence of multicollinearity among the study variables.

C. Heteroscedasticity Test

Heteroscedasticity was assessed by means of the Glejser test, whereby a significance value exceeding 0.05 is indicative of the absence of heteroscedasticity in the data.

Table 6. Heteroscedasticity Test Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.546	2.394		3.152	.002
	The Use of Gadgets as a Learning Resource	-.025	.039	-.063	-.636	.526
	Critical Thinking	-.042	.041	-.103	-1.038	.301

a. Dependent Variable: Abs_Res

Source: SPSS Data Processing Results, 2026

Given that the probability value in the table 6 which exceeds 0.05, heteroscedasticity is absent among the variables under investigation.

Table 7. Test Results of Linearity Test X1 Against Y

ANOVA							
			Sum of Squares	df	Mean Square	F	Sig
Economics Learning Outcomes* The Use of Gadgets as a Learning Resource	Between Groups	(Combined)	3715.093	25	148.604	4.783	.000
		Linearity	2781.165	1	2781.165	89.516	.000
		Deviation From Linearity	933.928	24	38.914	1.253	.214
	Within Groups		3541.843	114	31.069		
	Total		7256.936	139			

Source: SPSS Data Processing Results, 2026

The linearity assessment indicates that the association between device use as a learning resource (X1) and economic achievement (Y) is linear, with the deviation from linearity yielding 0.214 (greater than 0.05) and the linearity sig returning 0.000 (less than 0.05), thus providing no grounds for null hypothesis rejection.

Table 8. Test Results of the Linearity Test X2 Against Y

ANOVA							
			Sum of Squares	df	Mean Square	F	Sig
Economics Learning Outcomes* Critical Thinking	Between Groups	(Combined)	4322.844	25	172.914	6.718	.000
		Linearity	3577.570	1	3577.570	139.001	.000
		Deviation From Linearity	745.274	24	31.053	1.207	.252
	Within Groups		2934.092	114	25.738		
	Total		7256.936	139			

Source: SPSS Data Processing Results, 2026

The linearity assessment for X2 and Y yielded a deviation from linearity of 0.252 (exceeding 0.05) and a linearity sig of 0.000 (below 0.05), indicating a linear association and no basis for null hypothesis rejection.

Table 9. Test Results of Linearity Test Results X1 Against X2

ANOVA							
			Sum of Squares	df	Mean Square	F	Sig
Critical Thinking* The Use of Gadgets as a Learning Resource	Between Groups	(Combined)	2811.012	25	112.440	3.493	.000
		Linearity	1798.982	1	1798.982	55.888	.000
		Deviation From Linearity	1012.030	24	42.168	1.310	.174
	Within Groups		3669.524	114	32.189		
	Total		6480.536	139			

Source: SPSS Data Processing Results, 2026

The linearity assessment for X1 and X2 produced a deviation from linearity of 0.174 (exceeding 0.05) and a linearity sig of 0.000 (below 0.05), indicating a linear association and no grounds to reject the null hypothesis.

4.1.3. Hypothesis Testing

In this study, hypothesis testing was employed to ascertain the influence of gadget utilization as a learning resource on both critical thinking and economics learning outcomes, carried out in accordance with the following sequential steps:

A. Correlation Coefficient Test

Table 10. Correlation Coefficients of X1 and X2 with Y

Correlations				
		The Use of Gadgets as a Learning Resource	Critical Thinking	Economics Learning Outcomes
The Use of Gadgets as a Learning Resource	Pearson Correlation	1	.527**	.619**
	Sig. (2-tailed)		.000	.000
	N	140	140	140
Critical Thinking	Pearson Correlation	.527**	1	.702**
	Sig. (2-tailed)	.000		.000
	N	140	140	140
Economics Learning Outcomes	Pearson Correlation	.619**	.702**	1
	Sig. (2-tailed)	.000	.000	
	N	140	140	140

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Data Processing Results, 2026

All pairwise variable correlations produced a p-value of 0.000, which is less than the 0.01 significance level (two-tailed), indicating that the relationships between study constructs are statistically meaningful.

B. Path Coefficient Test

Table 11. Coefficient of Determination of X1 on X2

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.527[a]	.278	.272	5.824

a. Predictors: (Constant), The Use of Gadgets as a Learning Resource

b. Dependent Variable: Critical Thinking

Source: SPSS Data Processing Results, 2026

The coefficient of determination (R^2) was 0.278, indicating that the construct 'The Use of Gadgets as a Learning Resource' accounts for only 27.8% of the variability in critical thinking; this falls into the 'weak' category, defined as when R^2 is greater than 0.19 and less than 0.33, whilst the remaining 72.2% is explained by other constructs not included in this study. Thus, for the path coefficient of X1 on X2, the error is obtained = $\sqrt{1 - R^2}$ = 0.850.

Table 12. Results of the F-test for X1 against X2

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1798.982	1	1798.982	53.029	.000[b]
	Residual	4681.554	138	33.924		
	Total	6480.536	139			

a. Dependent Variable: Critical Thinking

b. Predictors: (Constant), The Use of Gadgets as a Learning Resource

Source: SPSS Data Processing Results, 2026

With an F-value of 53.029 and a significance level of 0.000 (less than 0.05), the F-test indicates a statistically significant model.

Table 13. T Test Results of Path Coefficient X1 Against X2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.667	4.853		2.816	.006
	The Use of Gadgets as a Learning Resource	.509	.070	.527	7.282	.000

a. Dependent Variable: Critical Thinking

Source: SPSS Data Processing Results, 2026

A Beta value of 0.527 emerged from the standardized coefficients, corresponding to a p-value of 0.000, which is less than 0.05 and thus confirms the significance of the X1 to X2 path (PX1X2 = 0.527).

Table 14. Coefficients of Determination for X1 and X2 to Y

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.761[a]	.579	.573	4.7229

a. Predictors: (Constant), Critical Thinking, The Use of Gadgets as a Learning Resource
b. Dependent Variable: Economics Learning Outcomes

Source: SPSS Data Processing Results, 2026

The R^2 value of 0.579 falls within the moderate range (between 0.33 and 0.67), indicating that gadget utilization and critical thinking jointly explain 57.9% of economic learning outcome variance. The remaining 42.1% of the variance is attributable to other constructs that fall outside the purview of this study. Accordingly, the resultant error coefficient was computed at 0.649.

Table 15. Results of the F-test for X1 and X2 against Y

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4201.059	2	2100.529	94.170	.000[b]
	Residual	3055.877	137	22.306		
	Total	7256.936	139			

a. Dependent Variable: Economics Learning Outcomes
b. Predictors: (Constant), Critical Thinking, The Use of Gadgets as a Learning Resource

Source: SPSS Data Processing Results, 2026

As presented in the F-test table, the F value stands at 94.170, accompanied by a significance level of 0.000, which falls beneath 0.05.

Table 16. Results of T Test Lines Coefficient X1, X2 Against Y

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	30.784	4.046		7.608	.000
	The Use of Gadgets as a Learning Resource	.352	.067	.345	5.287	.000
	Critical Thinking	.551	.069	.520	7.978	.000

a. Dependent Variable: Economics Learning Outcomes

Source: SPSS Data Processing Results, 2026

(PX1Y): the path coefficient is 0.345. P-value 0.000 < 0.05.
(PX2Y): the path coefficient is 0.520. P-value 0.000 < 0.05.

Table 17. Summary of Hypothesis Test Results

Direct influence	Path Coefficient (p)	p-value	Summary
X1 to Y (PX_1Y)	0.345	0.000	Significant
X2 to Y (PX_2Y)	0.520	0.000	Significant
X1to X2 (PX_1X_2)	0.527	0.000	Significant

Source: SPSS Data Processing Results, 2026

Multiplying the path coefficients PX1X2 (0.527) and PX2Y (0.520) produces an indirect effect of 0.274. When combined with the direct effect of 0.345, the total influence amounts to 0.619.

4.1.4. Sobel test

$$S_{ab} = \sqrt{b^2Sa + a^2Sb^2 + Sa^2Sb^2}$$
$$= \sqrt{(0{,}520)^2(0{,}069)^2 + (0{,}527)^2(0{,}070)^2 + (0{,}069)^2(0{,}070)^2}$$
$$= \sqrt{(0{,}2704) \times (0{,}004761) + (0{,}277729) \times (0{,}0049) + (0.004761) \times (0{,}0049)}$$
$$= \sqrt{0{,}0012873744 + 0{,}0013608721 + 0{,}0000233289}$$
$$= \sqrt{0{,}0026715754}$$
$$= 0{,}0516872846$$
$$t_{value} = \frac{ab}{Sab} = \frac{0{,}274}{0{,}516872846} = 5{,}301110362450729 = 5{,}3011$$
$$t_{table} = df: \propto = 1{,}65581$$

Since the t-value surpasses the tabulated threshold, the mediation coefficient of 0.274 attains statistical significance, affirming critical thinking's mediating role. This result may also be corroborated via an online Sobel Test Calculator.

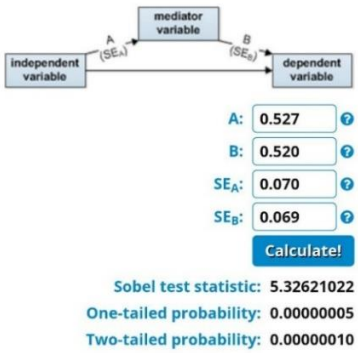

Figure 5. Results of the Sobel Test

With a Sobel z-statistic of 5.326 above the 1.96 criterion and a significance level of 0.000, the mediation hypothesis is supported. Critical thinking serves as a significant intermediary between gadget utilization and economic outcomes, implying that device-based learning directly influences results and simultaneously fortifies analytical capacity, thereby promoting overall academic gains.

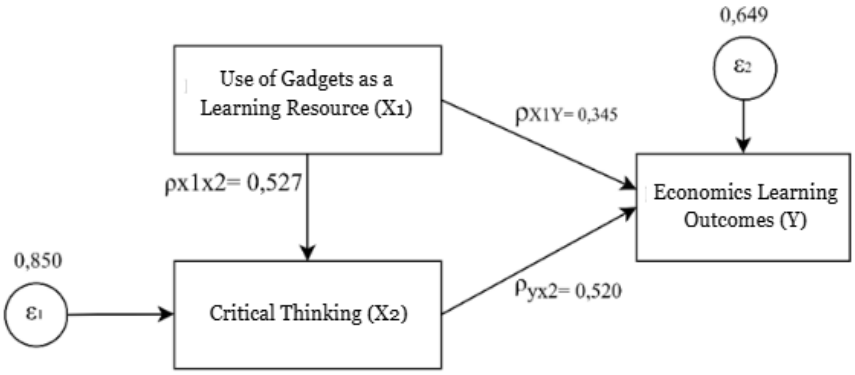

Figure 6. Path Diagram between X1, X2 and Y
Source: SPSS Data Processing Results, 2026

1) Path coefficient of The Use of Gadgets as a Learning Resource to Economics Learning Outcomes
   $Y = P_{X1y}X_1$
   $Y = 0{,}345X_1$
2) Path coefficient of Critical Thinking to Economics Learning Outcomes
   $Y = P_{X2y}X_2$
   $Y = 0{,}520X_2$
3) Path coefficient of The Use of Gadgets as a Learning Resource to Critical Thinking
   $X2 = P_{X1X2}X_1$
   $X2 = 0{,}527X_2$
4) Path coefficient of The Use of Gadgets as a Learning Resource to Economics Learning Outcomes through Critical Thinking
   $Y = P_{X1y}X_1 + P_{X2y}X_2$
   $Y = 0{,}345X_1 + 0{,}520X_2$

4.2. Discussion

4.2.1. The Direct Effect of the Use of Gadgets as a Learning Resource on Economics Learning Outcomes

Hypothesis testing revealed a path coefficient of 0.345 ($p = 0.000 < 0.05$) for the effect of gadget utilization on economic outcomes, confirming statistical significance and leading to acceptance of H1. This establishes a positive direct influence of X1 upon Y. The finding further suggests that the more optimally gadgets are employed as a learning resource within the instructional process, the more favorable the economics learning outcomes attained by students.

This finding is consonant with the Unified Theory of Acceptance and Use of Technology (UTAUT) advanced by Venkatesh et al. (2003), which asserts that technology utilization is shaped by several key constructs: when students perceive that gadget use can enhance their learning performance (performance expectancy), is readily manageable (effort expectancy), is endorsed by their social environment (social influence), and is adequately supported by

available facilities (facilitating conditions), these perceptions collectively foster the formation of behavioral intention and give rise to optimal technology use behavior.

In the Indonesian context, this finding is particularly salient. The path coefficient of 0.345 indicates that purposeful gadget use meaningfully contributes to economics learning outcomes among tenth-grade students, a population in which 39.27% had yet to meet the minimum passing threshold of 75. Given the high smartphone penetration rate of 173 million mobile internet users nationally (Statista, 2024) and the availability of institutional Wi-Fi at SMAN 107 East Jakarta, the conditions for productive gadget integration are structurally present; the challenge lies in redirecting existing usage patterns toward academically purposeful engagement.

These findings are supported by Maulana (2025) research, wherein regression analysis revealed a significance value of 0.000 < 0.05, indicating that gadget use has a significant and positive effect on students' learning outcomes in the subject of economics for Year 11 at State Senior High School 1 Kampar. An R^2 value of 0.469 indicates that gadget use contributes 46.9% to learning outcomes. In line with the research by Ramadhina et al. (2023) on tenth-grade students studying economics at SMA Muhammadiyah 11 in East Jakarta, involving 104 student samples, which showed that gadget use and interest in learning had a direct effect on learning outcomes of 0.439 and 0.549, respectively, as well as an indirect effect via interest in learning of 0.464 ($p < 0.05$). Another study by Ramdani and Mesra (2024) found that gadget use had a positive and significant effect on learning outcomes in sociology at SMAN 1 Sukaraja, Bogor Regency, with a significance value of 0.006 < 0.05.

4.2.2. The Direct Effect of Critical Thinking on Economics Learning Outcomes

The direct effect of X2 on Y yielded a path coefficient of 0.520 at a significance level of 0.000, falling beneath the 0.05 criterion. H2 is therefore accepted, confirming that critical thinking positively and directly influences economic learning outcomes. This finding is consistent with the theoretical postulation of Ennis (2011), which holds that critical thinking encompasses several interrelated cognitive abilities, namely the capacity to offer elementary clarification, establish basic foundational skills, draw reasoned conclusions, furnish advanced explanations, and formulate effective problem-solving strategies and tactics. Well-developed critical thinking skills are therefore capable of bearing a significant influence on students' economics learning outcomes. Drawing upon Bloom's Taxonomy, learning outcomes are broadly categorized into three domains: cognitive, affective, and psychomotor. Within the scope of this study, however, learning outcomes were specifically concentrated on the cognitive domain, which concerns students' ability to comprehend, apply, and analyze economic subject matter. Therefore, the higher a student's critical thinking ability, the better their understanding of the subject matter, thereby improving their Economics Learning Outcomes.

This finding acquires heightened significance within the Indonesian educational context, where PISA 2022 data indicate that the majority of Indonesian students operate at rudimentary levels of cognitive competency, performing considerably below the OECD mean across mathematics, reading, and scientific literacy. The path coefficient of 0.520, the strongest direct effect observed in this study, suggests that critical thinking constitutes the most consequential determinant of economics learning outcomes among the variables examined, implying that instructional investments targeting cognitive skill development would yield more substantial academic returns than technology provision alone.

Corroborating evidence emerges from Susanti et al. (2024), whose study of 80 Year 8 students from a population of 405 at Kendari State Junior High School 4 produced a critical thinking influence coefficient of 0.294 and an R^2 of 0.315. Further confirmation is furnished

by Gaol et al. (2022), demonstrating a significant effect at SD Negeri 11 Lubuk Cuik, with r (0.837) exceeding r table (0.361) and t (8.095) surpassing t table (1.701) at α = 0.05.

4.2.3. The Direct Effect of the Use of Gadgets as a Learning Resource on Critical Thinking

Hypothesis testing confirmed a significant direct effect of gadget utilization (X1) on critical thinking (X2), with a path coefficient of 0.527 ($p = 0.000 < 0.05$), thereby supporting H3. The UTAUT framework by Venkatesh et al. (2003) explains gadget adoption through performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, and use behavior. Positive perceptions of utility and accessibility encourage students to incorporate devices into learning.

The utilization of gadgets as a learning resource can further support the cultivation of students' critical thinking skills. Drawing upon Ennis (2011), critical thinking encompasses the capacity to provide elementary clarification, establish basic foundational skills, draw reasoned conclusions, furnish advanced explanations, and devise effective problem-solving strategies and tactics. Through the use of gadgets as a learning resource, students are afforded the opportunity to access a broad spectrum of information, scrutinize instructional materials, and appraise diverse sources of knowledge with greater depth and discernment. Consequently, the purposeful use of gadgets as a learning resource can meaningfully foster the advancement of students' critical thinking skills.

Supporting evidence from Ningsih and Shanie (2023) demonstrated that gadget utilization significantly influences critical thinking skills in primary students, yielding $t = 3.115 > 2.042$. Thus, gadgets not only facilitate information access but also directly bolster students' higher-order reasoning abilities. This finding warrants careful contextualization in light of observed student behavior at SMAN 107 East Jakarta, where a discernible subset of students was found to deploy AI-based tools such as ChatGPT to obtain instantaneous answers to practice questions, thereby circumventing the analytical reasoning processes through which critical thinking is substantively developed. The positive effect of gadget use on critical thinking ($\beta = 0.527$) is therefore conditional upon the quality of cognitive engagement it elicits: gadgets that prompt students to interrogate, evaluate, and synthesize information cultivate critical thinking, whilst those appropriated as reasoning shortcuts risk undermining it. This distinction is of direct relevance to Indonesian classrooms, where AI tool accessibility is increasing rapidly but pedagogical frameworks governing their use remain underdeveloped.

4.2.4. The Indirect Effect of the Use of Gadgets as a Learning Resource on Economics Learning Outcomes through Critical Thinking

An indirect pathway from gadget use to economic achievement through critical thinking was established, yielding a coefficient of 0.274. Sobel test results (manual and online) both indicated significance ($p < 0.05$), leading to acceptance of H4 and affirming critical thinking as a genuine mediator. According to UTAUT (Venkatesh et al., 2003), technology adoption is shaped by performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, and use behavior. Students who perceive gadgets as useful and accessible are more inclined to actively explore the informational resources these devices offer.

The use of gadgets as a learning resource can encourage students to access, process, and evaluate information, thereby enhancing their critical thinking skills. Critical thinking acts as a cognitive process that bridges the use of gadgets with Economics Learning Outcomes. Students with strong critical thinking skills are able to explain concepts simply, build foundational skills, draw conclusions, provide further explanations, and devise problem-solving strategies and tactics. This aligns with Bloom's Taxonomy; consequently, the use of

gadgets that stimulate critical thinking will lead to improved Economics Learning Outcomes for students.

Gadgets used as learning resources do not automatically improve Economics Learning Outcomes if they are merely utilized to passively receive information. However, when the use of gadgets stimulates students' critical thinking, the learning process becomes deeper and more meaningful, resulting in more optimal Economics Learning Outcomes. Therefore, critical thinking plays a significant role as an intervening variable in the relationship between the use of gadgets as a learning resource and students' Economics Learning Outcomes.

This mediating pathway carries direct policy implications for Indonesian secondary education. The documented tendency of students at SMAN 107 East Jakarta to employ AI tools as substitutes for independent reasoning, rather than as instruments that scaffold it, poses a tangible threat to this mediating mechanism. If gadget use stimulates cognitive bypassing rather than genuine critical engagement, the indirect pathway through which technology use improves learning outcomes is effectively neutralized, rendering the $\beta = 0.274$ indirect effect unattainable in practice. This underscores the urgency of instituting structured digital learning guidelines at both the school and national curriculum level, ensuring that gadget integration actively fosters students' higher-order cognitive capacities rather than supplanting them.

5. Conclusion

This investigation involved 140 tenth-grade students at SMAN 107 East Jakarta to assess how gadget utilization and critical thinking influence economic outcomes. Results show that gadget use positively affects both economic achievement ($\beta = 0.345$) and critical thinking ($\beta = 0.527$), while critical thinking itself positively predicts economic outcomes ($\beta = 0.520$). Additionally, critical thinking mediates the gadget-outcomes relationship ($\beta = 0.274$; $p < 0.05$). These findings carry implications at multiple levels. Theoretically, the study affirms that technology adoption yields meaningful academic gains only when accompanied by higher-order cognitive engagement. At the policy level, schools are encouraged to formulate structured digital learning policies governing purposeful gadget use, whilst the Ministry of Education is urged to embed digital literacy and critical thinking competencies within the national curriculum and teacher professional development programs.

From a practical perspective, the findings highlight the importance of bolstering teacher facilitation in purposeful device utilization and fostering students' information synthesis capabilities as a core element of critical reasoning. The findings further indicate that students' mean learning outcomes remain below the minimum passing threshold, thereby necessitating concerted efforts directed toward the improvement of instructional quality and the cultivation of students' independent learning dispositions. Limitations of this investigation include dependence on subjective survey responses, limited variable coverage, modest explanatory power in one model, and confinement to one institution. Subsequent research is urged to expand variable inclusion, widen participant sampling, enrich indicator sets, and refine data collection timing. In application, schools should bolster tech integration, teachers are encouraged to embed gadget use and critical thinking cultivation, students should exercise prudent device utilization, and parents are called upon to guide usage and ensure an optimal study atmosphere at home.

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