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Learning environment and interactive media: effects on vocational students' learning interest

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Abstrak

Rendahnya minat belajar siswa sering kali menjadi penghambat dalam mencapai potensi akademik, yang dipicu oleh kurangnya stimulus lingkungan dan penggunaan metode pembelajaran yang monoton. Penelitian difokuskan menganalisis tiga aspek utama, yaitu: (1) pengaruh lingkungan belajar terhadap minat belajar; (2) pengaruh media pembelajaran interaktif terhadap minat belajar; serta (3) pengaruh secara bersamaan antara lingkungan belajar dan media interaktif terhadap minat belajar siswa jurusan MPLB di SMK Negeri 1 Boyolali. Penelitian ini mengadopsi pendekatan kuantitatif dengan desain korelasional. Partisipan terdiri dari 104 siswa yang dipilih melalui teknik simple random sampling. Data dihimpun menggunakan instrumen kuesioner tertutup berbasis skala likert 5 yang telah teruji validitas dan reliabilitasnya. Kemudian diolah menggunakan uji regresi linear berganda melalui perangkat lunak IBM SPSS25. Temuan riset mengindikasikan bahwa: (1) lingkungan belajar berkontribusi positif dan signifikan terhadap minat belajar (sig. 0,00 < 0,05; t_{hitung} 4,299 > 1,984); (2) media pembelajaran interaktif memiliki dampak positif dan signifikan pada minat belajar (sig. 0,00 < 0,05; t_{hitung} 6,362 > 1,984); dan (3) secara bersamaan, kedua variabel independen tersebut berpengaruh signifikan terhadap minat belajar siswa (sig. 0,00 < 0,05; F_{hitung} 88,848 > 3,094). Implikasi praktis penelitian ini menegaskan sekolah perlu memprioritaskan integrasi teknologi interaktif dan perbaikan fasilitas fisik guna mengoptimalkan atensi akademik siswa.

Kata kunci: atensi akademik; ekosistem pendidikan; kuantitatif; regresi linear berganda; visualisasi instruksional

Abstract

Low student interest in learning frequently constitutes a barrier to the realization of academic potential, attributable to insufficient environmental stimulation and the adoption of monotonous instructional methods. This study examined three primary objectives: (1) the influence of the learning environment on learning interest; (2) the influence of interactive learning media on learning interest; and (3) the simultaneous influence of both the learning environment and interactive media on the learning interest of students in the Office Management and Business Services (MPLB)

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program at SMK Negeri 1 Boyolali. A quantitative approach with a correlational design was employed. Participants comprised 104 students selected through simple random sampling. Data were collected using a closed-ended questionnaire instrument based on a five-point Likert scale, the validity and reliability of which had been previously verified. Data were subsequently analyzed using multiple linear regression via IBM SPSS Statistics 25. The findings indicate that: (1) the learning environment exerted a positive and significant influence on learning interest ($p = .000 < .05$; $t(102) = 4.299 > 1.984$); (2) interactive learning media exerted a positive and significant influence on learning interest ($p = .000 < .05$; $t(102) = 6.362 > 1.984$); and (3) both independent variables simultaneously exerted a significant influence on student learning interest ($p = .000 < .05$; $F(2, 101) = 88.848 > 3.09$). The practical implications of this study highlight the need for schools to prioritize the integration of interactive technology alongside improvements to physical facilities in order to optimize student academic engagement.

Keywords: academic attention; educational ecosystem; instructional visualization; multiple linear regression; quantitative

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Introduction

In an era of rapid technological advancement, learning interest has emerged as a critical determinant of students' capacity to adapt to contemporary demands. When students exhibit genuine interest in a subject, they tend to engage more actively and persist in their efforts to acquire knowledge (Asanre et al., 2024; Harefa, 2023). High learning interest is manifested through sustained focus, enthusiasm, and facility in comprehending instructional material (Slameto, 2020). Operationally, learning interest is defined as an internal drive that stimulates student engagement, measurable through indicators such as positive affect, curiosity, attentiveness, and active participation in the learning process (Lestari & Yudhanegara, 2017). Conversely, students with low learning interest tend to demonstrate diminished motivation, poor concentration, and passive behavior during instruction, which inevitably impedes their attainment of academic potential (Sunanih et al., 2025). This condition was observed during preliminary observations at SMK Negeri 1 Boyolali, where approximately 78% of students in the Office Management and Business Services program reported finding the instructional material insufficiently engaging, reflecting a serious concern regarding low learning interest.

Among the various factors contributing to this condition, external variables specifically the learning environment and instructional media emerge as particularly relevant. The learning environment constitutes a crucial variable encompassing all physical and social conditions surrounding students that may stimulate their learning motivation (Pratama et al., 2025). It extends beyond physical facilities (infrastructure) to include the social climate, such as teacher–student relationships and peer interactions (Marini, 2017). Prior research by Dewi and Ibrahim (2024) and Fathoni (2018) has confirmed that a conducive learning environment ranging from comfortable classroom conditions to positive social interactions is significantly correlated with student motivation and learning aspiration. This perspective aligns with the behaviorist framework, which posits that the learning environment functions as a critical stimulus during instruction (Wedanthi et al., 2025), and is further supported by constructivist theory, which emphasizes the active role of students in learning through environmental interaction (Bustomi et al., 2024).

Although prior studies, including those of Fathoni (2018) and Tarsha et al. (2024), have demonstrated the positive influence of the learning environment and interactive learning media on

learning interest in isolation, a notable scarcity of literature has examined the combined effectiveness of both variables within a single comprehensive model. Furthermore, the majority of existing research has focused on general education, without fully representing the specific dynamics of vocational secondary education (SMK), which is characterized by a dominant emphasis on practical instruction. The present study therefore addresses this research gap by examining how the synergy between a conducive learning environment and the use of interactive media can promote learning interest, specifically among MPLB students at SMKN 1 Boyolali.

Interactive learning media are technology-based instructional tools that facilitate students' direct engagement in the learning process (Kristanto, 2016; Ramadhani, 2018). These media are characterized by the integration of text, image, audio, and video elements that enable bidirectional interaction between users and instructional content (Ramadhani, 2018). Such media have demonstrated significant potential in enhancing student engagement and participation, as they render abstract concepts concrete (Ariani & Suciptaningsih, 2023; Tarsha et al., 2024). This is consistent with the Cognitive Theory of Multimedia Learning, which posits that instruction is more effective when information is presented simultaneously through visual and verbal channels (Mayer, 2024). A synthesis of the foregoing research indicates that the integration of a supportive learning environment with interactive media constitutes a foundational prerequisite for establishing an effective learning ecosystem.

The research questions guiding this study are as follows: (1) Does the learning environment significantly influence the learning interest of MPLB students at SMK Negeri 1 Boyolali? (2) Does the use of interactive learning media significantly influence student learning interest? (3) Do the learning environment and interactive learning media, considered simultaneously, exert a significant influence on student learning interest? Accordingly, this study aims to: (1) determine whether the learning environment influences the learning interest of MPLB students at SMK Negeri 1 Boyolali; (2) determine whether interactive learning media influences student learning interest; and (3) determine whether the learning environment and interactive learning media jointly influence student learning interest.

Based on the theoretical framework and conceptual model developed, the following hypotheses were proposed: H1 The learning environment exerts a positive and significant influence on the learning interest of MPLB students at SMK Negeri 1 Boyolali; H2 Interactive learning media exerts a positive and significant influence on student learning interest; and H3 The learning environment and interactive learning media jointly exert a positive and significant influence on student learning interest.

Reasearch Methods

This study was conducted at SMK Negeri 1 Boyolali, a site selected based on the presence of specific concerns regarding the learning interest of MPLB students, as well as the availability of data and institutional research approval. The study was carried out from October 2024 to August 2025, encompassing all research phases from preparation through final report completion.

A quantitative method with a correlational design was employed, utilizing multiple linear regression analysis to evaluate the influence of the independent variables on the dependent variable. The study population comprised 140 MPLB students in Grades 11 and 12 who had been enrolled in the program for more than one year at SMK Negeri 1 Boyolali. The study examined three variables: two independent variables Learning Environment (X_1) and Interactive Learning Media (X_2) and one dependent variable, Learning Interest (Y). Simple random sampling was adopted as the probability sampling technique, given that the population was homogeneous with respect to curriculum and learning facilities, without significant stratification by grade. Sample size was determined using Slovin's formula with a 5% margin of error, yielding a total sample of 104 students, whose questionnaires were distributed proportionally across four classes to ensure adequate representation.

Data were collected using a closed-ended questionnaire administered via Google Forms, employing a five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). The instrument comprised 48 items distributed across three variables: Learning Interest (15 items), Learning Environment (14 items), and Interactive Learning Media (19 items). Prior to deployment,

the instrument underwent a pilot test with 30 non-sample respondents. Item validity was assessed using Pearson Product-Moment correlation, with items deemed valid where r > r-table (0.361). Instrument reliability was measured using Cronbach's alpha, with a threshold coefficient of $\alpha > 0.60$. Results of the pilot test confirmed that all items satisfied the criteria for both validity and reliability.

Data were analyzed using IBM SPSS Statistics 25. Prior to hypothesis testing, four prerequisite assumption tests were conducted: normality, linearity, multicollinearity, and heteroscedasticity. Hypothesis testing was subsequently performed using multiple linear regression analysis, encompassing the t-test (partial effects), the F-test (simultaneous effects), the coefficient of determination (R^2), and calculations of effective contribution (EC) and relative contribution (RC).

Result and Disscussion

Research Result

Based on descriptive data collected from 104 respondents, the Learning Interest variable (Y) yielded scores ranging from 49 to 75, with a mean (M) of 62.49 and a standard deviation (SD) of 5.30. This variable comprised 15 Likert-scale items with a cumulative total score of 6,499. The Learning Environment variable (X_1) produced scores ranging from 41 to 70, with M = 56.29 and SD = 5.93 (total score = 5,855; 14 items). The Interactive Learning Media variable (X_2) yielded scores ranging from 45 to 95, with M = 76.75 and SD = 9.31 (total score = 8,005; 19 items).

Table 1
Descriptive Statistics for All Research Variables

	Learning Environment	Interactive Learning Media	Learning Interest
Valid	104	104	104
Missing	0	0	0
Mean	56,2981	76,9904	62,4904
Std. Error of Mean	0,58339	0,91268	0,52013
Median	56,0000	76,5000	62,5000
Mode	56,00	76,00	63,00
Std. Deviation	5,94943	9,30758	5,30432
Variance	35,396	86,631	28,136
Range	29,00	50,00	26,00
Minimum	41,00	45,00	49,00
Maximum	70,00	95,00	75,00
Sum	5855,00	8007,00	6499,00

Source: Data processed by the researchers (2025)

The normality assumption was examined using the Kolmogorov–Smirnov test, which yielded a significance value of .200 (> .05), confirming that the residuals were normally distributed. The linearity assumption was assessed for each predictor–outcome pairing. The relationship between the Learning Environment (X_1) and Learning Interest (Y) produced a deviation from linearity significance value of .089 (> .05), indicating a linear relationship. Similarly, the relationship between Interactive Learning Media (X_2) and Learning Interest (Y) yielded a deviation from linearity significance value of .500 (> .05), also confirming linearity. Multicollinearity diagnostics revealed Tolerance = 0.540 and Variance Inflation Factor (VIF) = 1.850 for all predictor variables. As the Tolerance value exceeded 0.10 and the VIF remained below 10, the regression model was deemed free from multicollinearity bias. Finally, the Glejser test for heteroscedasticity yielded significance values of .418 for the Learning Environment and .701 for Interactive Learning Media. Given that both values exceeded the .05 threshold, heteroscedasticity was not present in the regression model.

Table 2
Multiple Linear Regression Coefficients

Model	Unstandardized Coefficients	
	B	Std. Error
(Constant)	22,163	3,128
Learning Environment (X_1)	0,312	0,073
Interactive Learning Media (X_2)	0,295	0,046

Source: Data processed by the researchers (2025)

The regression equation derived from these results is expressed as follows:

$$\mathbf{Y = 22{,}163 + 0{,}312X_1 + 0{,}295X_2}$$

The constant of 22.163 represents the predicted baseline value of Learning Interest in the absence of any influence from the independent variables. The regression coefficients for X_1 (0.312) and X_2 (0.295) indicate that each one-unit increase in the quality of the learning environment or interactive media use is associated with a corresponding positive increase in the learning interest score.

Table 3
Results of the Partial t-Test

Model	t	Sig.
Learning Environment (X_1)	4,299	0,000
Interactive Learning Media (X_2)	6,362	0,000

Source: Data processed by the researchers (2025)

As presented in Table 3, the Learning Environment (X_1) yielded $t(102) = 4.299$, $p = .000$. Given that t (4.299) exceeded t-table (1.984) and $p < .05$, the null hypothesis was rejected, confirming that the Learning Environment exerted a statistically significant positive influence on Learning Interest. The Interactive Learning Media variable (X_2) yielded $t(102) = 6.362$, $p = .000$, likewise exceeding the t-table value of 1.984. The null hypothesis was therefore rejected, confirming that Interactive Learning Media exerted a statistically significant positive influence on Learning Interest.

Table 4
Results of the Simultaneous F-Test

Model	F	Sig.
Regression	88,848	,000[b]

Source: Data processed by the researchers (2025)

The results presented in Table 4 indicate that $F(2, 101) = 88.848$, $p = .000$. Given that F (88.848) substantially exceeded F-table (3.09) and $p < .05$, the null hypothesis was rejected. This finding confirms that the Learning Environment (X_1) and Interactive Learning Media (X_2) jointly exerted a statistically significant influence on Learning Interest (Y), demonstrating that the two independent variables collectively function as robust predictors of student learning interest.

Table 5
Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,798[a]	0,638	0,630	3,22465

Source: Data processed by the researchers (2025)

As shown in Table 5, the coefficient of determination (R^2) was 0.638, indicating that 63.8% of the variance in student learning interest was explained by the combined influence of the Learning Environment and Interactive Learning Media. The remaining 36.2% was attributable to other variables not included in this model. Effective contribution (EC) and relative contribution (RC) analyses further revealed that Interactive Learning Media contributed more substantially (EC = 39.2%; RC = 61.4%) than the Learning Environment (EC = 24.6%; RC = 38.6%), with the combined EC of both variables totaling 63.8%, consistent with the R^2 value.

Discussion

Influence of the Learning Environment (X_1) on Learning Interest (Y)

The first hypothesis, which proposed a positive and significant influence of the learning environment on the learning interest of MPLB students at SMKN 1 Boyolali, was supported by the data. Statistical analysis confirmed that the learning environment exerted a positive and significant effect on learning interest (t = 4.299, B = 0.312). This finding reinforces the behaviorist postulate advanced by B.F. Skinner, which holds that learning behavior can be shaped through environmental stimuli in the form of positive reinforcement; a conducive classroom atmosphere acts as such a reinforcer, thereby stimulating student enthusiasm. These results are consistent with prior studies by Fathoni (2018) and Prawidia and Khusna (2021), both of which identified the learning environment as a significant predictor of student learning interest.

Influence of Interactive Learning Media (X_2) on Learning Interest (Y)

The second hypothesis was supported, with t = 6.362 confirming that interactive learning media functioned as a strong predictor of learning interest growth. The regression coefficient of 0.295 indicates that for each one-unit improvement in the quality of interactive media use, student learning interest increased by a corresponding margin. This finding is theoretically consistent with Mayer's (2024) Cognitive Theory of Multimedia Learning, which posits that instruction is more effective and meaningful when information is delivered simultaneously through visual (images, video, animation) and verbal (text, audio) channels. These results also align with recent research by Tarsha et al. (2024), Putri and Sari (2024), and Pratama and Hasanah (2024), all of whom found that interactive media are highly effective in promoting learning interest and fostering more positive learning environments.

Simultaneous Influence of the Learning Environment (X_1) and Interactive Learning Media (X_2) on Learning Interest (Y)

The third hypothesis was confirmed by the simultaneous test, which demonstrated that the combined influence of the learning environment and interactive learning media on student learning interest was statistically significant. This is supported by F(2, 101) = 88.848, substantially exceeding F-table (3.09), with p = .000, thereby affirming the validity of the overall regression model. The regression equation ($\hat{Y} = 22.163 + 0.312X_1 + 0.295X_2$) indicates that when both independent variables are equal to zero, Learning Interest is estimated at 22.163. The adjusted R^2 of 0.638 demonstrates that this combination of variables accounts for 63.8% of the total variance in student learning interest.

A more detailed examination of the effective contribution (EC) analysis reveals that Interactive Learning Media contributed more substantially (EC = 39.2%) than the Learning Environment (EC = 24.6%). This dominance may be attributed to the characteristics of current SMK

students as digital natives who are inherently more responsive to visual and technological stimuli than to physical classroom conditions alone. This finding offers a novel perspective relative to earlier studies such as Fathoni (2018) and Dewi and Ibrahim (2024), which tended to identify the learning environment and social interaction as the primary determinants. The present study demonstrates that, in the digital era, the learning environment serves primarily as a supporting facilitator, while interactive learning media functions as the primary accelerator of learning interest among MPLB students at SMKN 1 Boyolali.

From a theoretical standpoint, this study makes a significant contribution by reinforcing the integration of three foundational frameworks within the context of vocational education. First, the findings extend the Behaviorist Theory of Skinner (Wedanthi et al., 2025) by confirming that physical environmental stimuli remain relevant as a foundational prerequisite. Second, the results empirically validate Mayer's (2024) Cognitive Theory of Multimedia Learning, demonstrating that visual–verbal elements within interactive media optimize students' information processing. Third, the synergy of environment and media observed in this study provides an empirical model for Constructivist Theory as advanced by Piaget and Vygotsky (Bustomi et al., 2024), wherein the learning interest of vocational students is actively constructed through the dynamic interplay between external environmental support and instructional tools (media). Collectively, these findings underscore the importance of holistic intervention simultaneously cultivating a conducive learning environment and integrating interactive instructional media to optimize learning interest among MPLB students at SMKN 1 Boyolali.

Conclusion

Based on the data analysis and discussion, this study concludes that both the learning environment and the use of interactive learning media exert positive and statistically significant influences on student learning interest. Regression analysis revealed that each one-unit increase in the learning environment and interactive learning media was positively and significantly associated with learning interest, with respective regression coefficients of 0.312 and 0.295 and a constant of 22.163. The combined contribution of the two variables (R^2) reached 63.8%, with Interactive Learning Media demonstrating substantially greater dominance (RC = 61.4%) relative to the Learning Environment (RC = 38.6%). This indicates that while physical facilities provide foundational comfort, interactive media play a more substantial role as cognitive stimuli that prevent disengagement; the integration of both creates an effective learning ecosystem for vocational students. Theoretically, these findings reinforce the integration of Behaviorist, Cognitive Multimedia, and Constructivist theories in vocational education, demonstrating that learning interest is optimized through visual–verbal elements that facilitate active knowledge construction. The practical implications of this study highlight the importance of school policies directed toward creating a conducive learning climate and ensuring adequate physical infrastructure. Teachers are encouraged to develop varied instructional methods that combine digital media with engaging classroom management strategies. Policymakers should consider standardizing the incorporation of interactive media within vocational curricula. As this study was limited to Grade 11 and Grade 12 MPLB students at SMK Negeri 1 Boyolali, future research is recommended to extend the population to other schools or regions in order to assess the generalizability of the findings. Further research may also incorporate mediating or moderating variables, such as self-efficacy and achievement motivation, and apply longitudinal or quasi-experimental designs to examine the effectiveness of interactive media in greater depth and with greater precision.

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