Impact of moving class, AI technology, and infrastructure on students' mental well-being at SMK 6 Surakarta

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Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh moving class, teknologi pembelajaran AI, dan sarpras terhadap mental well-being siswa SMK 6 Surakarta baik secara simultan maupun parsial. Penelitian ini menggunakan pendekatan penelitian kuantitatif. Sampel berjumlah 85 dengan teknik sampel stratified random sampling. Teknik pengumpulan data menggunakan angket. Teknik analisis data menggunakan teknik analisis linear berganda dengan bantuan IBM SPSS versi 26. Hasil penelitian menunjukkan bahwa: (1) terdapat pengaruh yang positif dan signifikan moving class terhadap mental well-being siswa SMK Negeri 6 Surakarta dengan nilai $t_{hitung} > tt_{abel}$ (1,86 > 1,66) dan nilai signifikasi pada moving class sebesar 0,06 < 0,1; (2) tidak terdapat pengaruh yang positif dan signifikan teknologi pembelajaran AI terhadap mental well-being siswa SMK Negeri 6 Surakarta dengan nilai $t_{hit}ung < tt_{abel}$ (1,52 < 1,66) dan nilai signifikansi 0,13 > 0,05; (3) terdapat pengaruh yang positif dan signifikan sarpras terhadap mental well-being siswa SMK Negeri 6 Surakarta dengan nilai $t_{hit}ung > tt_{abel}$ (4,46 > 1,66) dengan nilai signifikansi 0,00 < 0,05; (4) Terdapat pengaruh yang positif dan signifikan secara bersama-sama moving class, teknologi pembelajaran AI, dan sarpras terhadap mental well-being siswa SMK Negeri 6 Surakarta dengan nilai $F_{hit}ung > Ft_{abel}$ (17,39 > 4,14) dengan nilai signifikansi 0,00 <0,05.

Keywords : kesehatan mental; sarana pembelajaran; sistem pembelajaran; teknologi pembelajaran

Abstract

This study aims to determine the effect of moving class, AI learning technology, and infrastructure on the mental well-being of students of SMK 6 Surakarta both simultaneously and partially. This study uses a quantitative research approach. The sample amounted to 85 with stratified random sampling technique. The data collection technique used a questionnaire. Data analysis techniques using multiple linear analysis techniques with the help of IBM SPSS version 26. The results showed that: (1) there is a positive and significant effect of moving class on mental

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well-being of students of SMK Negeri 6 Surakarta with a $t_{value} > t_{table}$ (1.86> 1.66) and a significance value on moving class of 0.06 < 0.1; (2) there is no positive and significant effect of AI learning technology on mental well-being of students of SMK Negeri 6 Surakarta with a $t_{value} < t_{table}$ (1.52 < 1.66) and a significance value of 0.13 > 0.05; (3) there is a positive and significant influence of infrastructure on mental well-being of students of SMK Negeri 6 Surakarta with the value of $t_{value} > t_{table}$ (4.46 > 1.66) with a significance value of 0.00 < 0.05; (4) there is a positive and significant influence together moving class, AI learning technology, and infrastructure on mental well-being of students of SMK Negeri 6 Surakarta with the value of $F_{value} > F_{table}$ (17.39 > 4.14) with a significance value of 0.00 < 0.05.

Introduction

Mental well-being refers to a condition in which an individual can accept themselves as they are, build healthy relationships with both themselves and others, resist social pressures, adapt effectively to their environment, and find meaning and purpose in life. It plays a crucial role in helping adolescents develop positive emotions, enjoy a happier life, reduce tendencies toward negative behaviors, and manage their emotions more effectively (Fadhillah, 2016). Mental well-being is a vital factor in personal and social development. When individuals utilize good mental health and well-being, they become capable of addressing potential problems and selecting appropriate solutions (Emadpoor et al., 2016).

Mental health is a state of emotional well-being that enables individuals to cope with life's stresses, realize their abilities, learn and work productively, and contribute meaningfully to their communities. The term mental well-being describes an individual's psychological health based on the fulfillment of criteria for positive psychological functioning. It is a condition in which individuals can achieve and fully realize their potential. In this state, individuals are able to accept both their strengths and weaknesses, act independently, establish harmonious relationships with others, and adapt to their surroundings in alignment with their psychological condition. Furthermore, individuals with strong mental well-being possess a clear sense of life purpose and continuously strive for self-improvement (Ryff, 1989).

Students in vocational high schools (SMK) often experience challenges related to mental well-being during this developmental stage. This period involves a complex process of identity formation. Consequently, depression is among the most common mental health issues experienced by students. Mental health problems can also significantly affect academic performance. When students struggle to adjust or face difficulties, they often experience anxiety, fear, and challenges in interacting socially with peers (Mukarom & Daeli, 2023).

The digital era has transformed the ways in which people live, learn, and socialize. The emergence of social media, online gaming, and the internet has introduced both conveniences and serious challenges particularly for students' mental health. In this digital age, numerous challenges have arisen that impact students' mental well-being. Among these are cyberbullying, which can lead to anxiety and suicidal thoughts; FOMO (Fear of Missing Out), which stems from the desire to remain constantly connected and can cause stress and anxiety; and the tendency to compare oneself with others whose seemingly perfect lives are displayed on social media, potentially triggering feelings of inadequacy and unhappiness.

Mental well-being issues also occur among students in Class XI of the Multimedia and Printing Learning Cluster (MPLB) at SMK Negeri 6 Surakarta. Based on preliminary data collected prior to the study, 96% of these students frequently feel anxious or worried about their future, while

93% often experience pressure due to school assignments and academic demands. These figures indicate that the majority of students have encountered stress during the learning process, suggesting a significant issue concerning their mental well-being.

Several previous studies have identified factors influencing students' mental well-being. Campbell et al. (2022) emphasized that a strong social support network is crucial for maintaining good mental health. Students who experience a sense of belonging and maintain supportive relationships tend to report better mental health outcomes. According to Slimmen et al. (2022), academic pressures and stressors significantly contribute to the levels of stress experienced by students. This pressure can lead to elevated stress levels and negatively impact mental well-being. A lack of engagement in learning activities has also been associated with poorer mental health outcomes. Ismail and Shujaat (2018) found that family-related demands, particularly among female students, are linked to increased depression scores. Students from lower socioeconomic backgrounds or those enrolled in non-mainstream educational fields such as social sciences tend to report higher levels of stress and depressive symptoms.

The teacher-student relationship plays a critical role in shaping student mental well-being. Aulia (2018) stated that positive interactions between teachers and students can enhance feelings of safety and belonging within the school environment. Schools that foster supportive environments through comprehensive approaches engaging teachers, parents, staff, and community members positively influence student well-being.

One factor that can affect students' mental well-being is the learning system implemented in schools. The moving class system refers to an instructional model where teaching is organized based on subject matter. In this system, students move between classrooms depending on the subject being taught, allowing the learning environment to be adjusted according to the characteristics of each course (Saputro, 2019). Pedine (2021) explains that moving class is a learner-centered approach that emphasizes contextual learning by aligning the physical environment with the material being studied. This method allows for greater flexibility and can help reduce monotony in the learning process.

Another influential factor is AI-based learning technology. The advancement of Artificial Intelligence (AI) in education has transformed traditional classroom instruction. AI integration in education is reflected in blended learning models, which help minimize risks associated with conventional teaching methods and represent a novel approach to managing MOOC platforms (Wogu et al., 2019). Furthermore, blended learning supports the theory of AI and Marxian Alienation, highlighting the role of AI as an innovation in the learning process. Supriadi et al. (2022) argue that AI serves as a tool to facilitate the learning process and promote student independence. While the role of teachers may become less dominant, they remain essential in providing key explanations and maintaining the moral and ethical foundations of education.

A third factor that influences students' mental well-being during the learning process is the availability and quality of school infrastructure. Sarana refers to tools and equipment directly used to support the teaching and learning process, whereas prasarana includes facilities that indirectly support educational activities (Lintar, 2023). Every educational institution must provide adequate facilities such as buildings, classrooms, desks, chairs, and instructional media. Essential infrastructure includes land, classrooms, teacher rooms, administrative offices, libraries, laboratories, canteens, sports halls, worship rooms, and other spaces necessary for effective and sustainable learning. School infrastructure plays a crucial role in education as a primary supporting element, facilitating both direct and indirect aspects of the teaching-learning process toward achieving desired educational goals.

Based on the background outlined above, this study aims to address the following research questions: (1) Does the moving class system influence the mental well-being of Class XI MPLB students at SMK Negeri 6 Surakarta? (2) Does AI-based learning technology influence the mental well-being of these students? (3) Does school infrastructure influence their mental well-being? (4) Do the moving class system, AI-based learning technology, and school infrastructure collectively influence the mental well-being of Class XI MPLB students at SMK Negeri 6 Surakarta? By answering these questions, this study is expected to provide deeper insights for schools, educators, students, and future researchers regarding the importance of student mental well-being in educational settings.

Research Methodology

This study employed a quantitative approach with a survey method to examine the influence of the moving class system, AI-based learning technology, and school infrastructure on the mental well-being of Class XI MPLB students at SMK Negeri 6 Surakarta. The research was conducted in seven stages: research preparation, proposal development, instrument determination and construction, data collection, data processing and analysis, conclusion drawing, and report writing. The research period spanned from September 2024 to March 2025. The population consisted of 107 students, and a sample of 85 students was selected using stratified random sampling. The entire population was sampled based on Slovin's formula. Data were collected offline (in-person), utilizing Google Forms for questionnaire distribution.

Data collection was conducted using a closed-ended questionnaire based on a 5-point Likert scale, where respondents selected the answer most aligned with their personal circumstances. No validity and reliability tests were performed, as the instruments used were adapted from previous studies by Gautam et al. (2024), Wicono (2015), and Siswanto and Hidayati (2020). Data analysis involved several steps: data tabulation, classical assumption tests (normality test, linearity test, multicollinearity test, and heteroscedasticity test), hypothesis testing (multiple linear regression analysis, t-test, F-test, and coefficient of determination), and calculation of relative and effective contributions. All analyses were supported by IBM SPSS Statistics version 26.

Results and Discussion

Research results

Descriptive data analysis showed that the mental well-being variable had a minimum score of 24, maximum score of 62, an average score of 38, and a standard deviation of 6.07. The total accumulated value for the mental well-being variable based on collected data was 4198. This variable consisted of 14 statements measured using a 5-point Likert scale. The moving class system variable had a minimum score of 11, maximum score of 35, an average of 24, and a standard deviation of 3.72. The total accumulated score from collected data was 2101. This variable included 7 statements. The AI-based learning technology variable had a minimum score of 11, maximum score of 39, an average of 28, and a standard deviation of 5.51. The total accumulated score based on collected data was 2345. This variable also consisted of 8 statements. The school infrastructure variable had a minimum score of 12, maximum score of 40, an average of 28, and a standard deviation of 5.40. The total accumulated score from collected data was 2804. This variable contained 8 statements.

The prerequisite tests conducted in this study included normality, linearity, multicollinearity, and heteroscedasticity tests. The results of the normality test indicated that the Asymp. Sig. (2-tailed) value was 0.20, which is greater than 0.05. Therefore, it can be concluded that the data are normally distributed. Linearity test results between the moving class system (X_1) and mental well-being (Y) showed a significance value in the linearity row of 0.00, which is less than 0.05. Thus, it can be concluded that there is a linear relationship between these two variables. For the AI-based learning technology (X_2) and mental well-being (Y), the linearity test also yielded a significance value of 0.01, which is less than 0.05. Hence, a linear relationship exists between these variables. Similarly, the linearity test between school infrastructure (X_3) and mental well-being (Y) resulted in a significance value of 0.00, which is less than 0.05. Therefore, a significant linear relationship exists between these variables as well. Multicollinearity test results indicated that the moving class system variable had a tolerance value of 0.75 and VIF value of 1.32. The AI-based learning technology variable had a tolerance value of 0.92 and VIF value of 1.08. The school infrastructure variable had a tolerance value of 0.70 and VIF value of 1.41. All three variables had tolerance values above 0.10 and VIF values below 10. Therefore, it can be concluded that no multicollinearity issues exist among the independent variables. Heteroscedasticity testing using the Spearman-Rho method showed a significance value of 0.17 for the moving class system, indicating no heteroscedasticity since the value is greater than 0.05. For the AI-based learning technology variable, the significance value was 0.04, which is less than 0.05, suggesting the presence of

heteroscedasticity. Lastly, the school infrastructure variable had a significance value of 0.23, which is greater than 0.05, indicating no heteroscedasticity.

Table 1

t-test result

	T_{value}	Significance
(Constant)	4,74	0,00
Moving Class System	1,86	0,06
AI-based Learning Technology	1,52	0,13
School Facilities and Infrastructure	4,46	0,00

(Source: Data processed by researchers, 2025)

Based on Table 1 above, the results of the hypothesis testing show that the significance value for the moving class system (X_1) is 0.06. This value is greater than 0.05 but less than 0.1, with a t_{value} of 1.86, which exceeds the t_{table} value of 1.66. The t_{table} was determined at $\alpha = 0.05$ with degrees of freedom (df) = 81 (n – k – 1 or 85 – 3 – 1). Given that the significance value is less than 0.1 and the calculated t_{value} is higher than the table value, H_0 is rejected. This indicates a statistically significant partial effect of the moving class system variable (X_1) on students' mental well-being (Y). The significance value for AI-based learning technology (X_2) is 0.13, which is greater than 0.05. In addition, the calculated t_{value} (1.52) is lower than the t_{table} value (1.66). The t_{table} was also determined at $\alpha = 0.05$ with df = 81. Based on these findings, H_0 is accepted, indicating no statistically significant partial effect of the AI-based learning technology variable (X_2) on mental well-being (Y). Finally, the hypothesis testing results show that the school infrastructure variable (X_3) has a significance value of 0.00, which is less than 0.05. The calculated t_{value} (4.46) is also higher than the t_{table} value (1.66), based on the same degree of freedom. Therefore, H_0 is rejected, indicating a statistically significant partial effect of the school infrastructure variable (X_3) on students' mental well-being (Y).

Table 2

F-test result

	Sum of Squares	df	Mean Square	F	Significance
Regression	1214,69	3	404,89	17,39	0,00
Residual	1885,49	81	23,27		
Total	3100,18	84			

(Source: Data processed by researchers, 2025)

Based on Table 2, it can be observed that the probability value in the Sig. column is 0.00, which is less than 0.05. The calculated F_{value} is 17.39, which exceeds the critical F_{table} of 3.10 at $\alpha = 0.05$ with degrees of freedom df1 = 3 and df2 = 81. Based on these results, the null hypothesis (H_0) is rejected. This indicates that there is a statistically significant joint effect of the moving class system (X_1), AI-based learning technology (X_2), and school infrastructure (X_3) on the mental well-being (Y) of Class XI MPLB students at SMK Negeri 6 Surakarta.

Table 3

Multiple Linear Regression Analysis Results

	B	Std. Error	Beta
(Constant)	20,60	4,34	
Moving Class System	0,30	0,16	0,18
AI-based Learning Technology	0,15	0,09	0,13
School Facilities and Infrastructure	0,51	0,11	0,46

(Source: Data processed by researchers, 2025)

Based on Table 3 above, the regression equation obtained in this study is as follows:

$$Y = 20.60 + 0.30\ X_1 + 0.15\ X_2 + 0.51\ X_3 + e$$

This equation can be interpreted as follows: (1) The constant value of 20.60 indicates that if the values of all independent variables—moving class system (X_1), AI-based learning technology (X_2), and school infrastructure (X_3)—are zero, the predicted value of the dependent variable, mental well-being (Y), would be 20.60; (2) The regression coefficient for the moving class system variable (X_1) is positive 0.30. This means that, mathematically, if X_1 increases by one unit while X_2 and X_3 are held constant at zero, the predicted value of students' mental well-being (Y) increases to 20.90; (3) The regression coefficient for AI-based learning technology (X_2) is positive 0.15. This implies that if X_2 increases by one unit while X_1 and X_3 are held constant at zero, the predicted value of students' mental well-being (Y) rises to 20.75; (4) The regression coefficient for school infrastructure (X_3) is positive 0.51. This suggests that if X_3 increases by one unit while X_1 and X_2 are held constant at zero, the predicted value of students' mental well-being (Y) increases to 21.11.

Table 4
Results of Determination Coefficient Analysis

R	R Square	Adjusted R Square	Std. Error of the Estimate
0,62	0,39	0,36	4,82

(Source: Data processed by researchers, 2025)

Based on Table 4, the coefficient of determination (R^2) is 0.39. This indicates that 39% of the variation in students' mental well-being among Class XI MPLB students at SMK Negeri 6 Surakarta can be explained by the combined influence of the moving class system, AI-based learning technology, and school infrastructure. The remaining 61% is attributed to other factors or variables not included in this study.

Discussion

The Influence of the Moving Class System on the Mental Well-Being of Students in Class XI MPLB at SMK Negeri 6 Surakarta

The moving class system has a positive and statistically significant effect on the mental well-being of students in Class XI MPLB at SMK Negeri 6 Surakarta. As the implementation level of the moving class system increases, so does the students' mental well-being. Conversely, when the system is poorly implemented or inconsistently applied, students' mental well-being tends to decline.

The t-test results showed that the significance value for the moving class system was 0.06, which is less than 0.1 but greater than 0.05. In addition, the calculated t_{value}(1.86) exceeded the table t_{value}(1.66). Based on these findings, the null hypothesis (H_0) is rejected, indicating a statistically significant partial effect of the moving class system on students' mental well-being. The effective contribution of the moving class system to mental well-being was found to be 8%, which is higher than the effective contribution of AI-based learning technology. Therefore, improving the implementation of the moving class system should be prioritized to further enhance students' mental well-being.

The moving class system is an instructional model commonly adopted by international-standard schools. This system creates a more dynamic and flexible learning environment, encourages student participation, and fosters creativity. When properly implemented, it enhances the overall quality of the teaching and learning process at SMK Negeri 6 Surakarta. These findings align with previous research conducted by Suri et al. (2020), which also reported a positive influence of the moving class system on students' mental well-being.

The Influence of AI-Based Learning Technology on the Mental Well-Being of Students in Class XI MPLB at SMK Negeri 6 Surakarta

This study found no statistically significant relationship between AI-based learning technology and the mental well-being of students in Class XI MPLB at SMK Negeri 6 Surakarta. This result contradicts earlier findings by Abdillah et al. (2023), who concluded through comprehensive literature review that AI tools such as ChatGPT can improve student well-being in smart university environments.

The lack of a significant effect may be attributed to teachers' limited readiness to integrate AI-based technologies into their teaching practices. This lack of preparedness may have led to confusion among students regarding how to effectively use AI-based learning tools. Thus, this study concludes that AI-based learning technology did not significantly contribute to students' mental well-being. This suggests that other factors such as academic performance, social relationships, family environment, or economic conditions may play a more dominant role in influencing the mental well-being of students in this context.

The Influence of School Infrastructure on the Mental Well-Being of Students in Class XI MPLB at SMK Negeri 6 Surakarta

School infrastructure has a positive and statistically significant effect on the mental well-being of students in Class XI MPLB at SMK Negeri 6 Surakarta. When school facilities are well-maintained and adequately provided, students experience improved mental well-being. Conversely, if the condition of school infrastructure deteriorates or is insufficient, students' mental well-being declines.

The t-test results for school infrastructure yielded a significance value of 0.00, which is below the threshold of 0.05, and a calculated t_{value} (4.46) that exceeded the critical t_{value}(1.66). Therefore, H_0 is rejected, indicating a statistically significant individual effect of school infrastructure on students' mental well-being.

School infrastructure includes both movable and immovable assets necessary for supporting teaching and learning processes in educational institutions, either directly or indirectly. When school infrastructure is properly maintained and aligned with the actual needs of the institution, it contributes to a more comfortable and supportive learning environment, which in turn positively affects students' mental well-being.

These findings are consistent with those of Lintar (2023), who found that teachers can create a pleasant learning atmosphere by arranging classrooms neatly, keeping them clean, and ensuring they are conducive to learning. By doing so, teachers motivate students and foster a positive learning climate that supports mental well-being.

The Combined Influence of the moving class System, AI-Based Learning Technology, and School Infrastructure on the Mental Well-Being of Students in Class XI MPLB at SMK Negeri 6 Surakarta

Collectively, the moving class system, AI-based learning technology, and school infrastructure have a positive and statistically significant combined effect on the mental well-being of students in Class XI MPLB at SMK Negeri 6 Surakarta. As the levels of these three factors increase, so does the students' mental well-being.

Based on the F-test results, the probability value (Sig.) was 0.00, which is below the 0.05 significance level. Additionally, the calculated F_{value} was 17.39, which exceeds the critical F_{value} of 3.10. Therefore, H_0 is rejected, indicating a statistically significant joint effect of all three variables on students' mental well-being.

Further analysis of effective and relative contributions revealed that: (1) The moving class system (X_1) contributed 8% effectively and 20.52% relatively to students' mental well-being; (2) AI-based learning technology (X_2) contributed 4% effectively and 10.25% relatively; (3) School infrastructure (X_3) contributed 27% effectively and 69.23% relatively.

Conclusion

Based on the data analysis and hypothesis testing conducted in this study on the influence of the moving class system, AI-based learning technology, and school infrastructure on the mental well-being of Class XI MPLB students at SMK Negeri 6 Surakarta, several key conclusions can be drawn. First, the moving class system demonstrates a positive and statistically significant effect on students' mental well-being, as evidenced by a calculated t_{value} of 1.86, which exceeds the table value of 1.66. Second, AI-based learning technology does not show a statistically significant influence on students' mental well-being, with a calculated t_{value} of 1.52, which falls below the critical value of 1.66. Third, school infrastructure has a strong positive and statistically significant impact on students' mental well-being, supported by a calculated t_{value} of 4.46, which is significantly higher than the table value of 1.66. Finally, when considered collectively, the moving class system, AI-based learning technology, and school infrastructure demonstrate a jointly significant and positive influence on students' mental well-being, as shown by an F_{value} of 17.39 that surpasses the critical F_{value} of 4.14.

The coefficient of determination (R^2), derived from the Model Summary table, indicates a value of 0.39. This suggests that 39% of the variation in students' mental well-being can be explained by the combined influence of the three independent variables namely, the moving class system, AI-based learning technology, and school infrastructure. The remaining 61% is attributed to other external factors not included in this study.

Individually, the moving class system contributes 8% effectively to mental well-being, while AI-based learning technology contributes 4%. School infrastructure, however, shows the highest effective contribution at 27%, indicating its dominant role compared to the other two variables. In terms of relative contribution, the moving class system accounts for 20.52%, AI-based learning technology contributes 10.25%, and school infrastructure has the largest share at 69.23%. These findings suggest that among the three independent variables, school infrastructure exerts the strongest influence on the mental well-being of Class XI MPLB students at SMK Negeri 6 Surakarta.

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