

The Influence of Smartphone Usage on Social Interaction Among Vocational High School Students

Pengaruh Penggunaan Smartphone terhadap Interaksi Sosial Siswa Kelas X

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ABSTRACT

The development of technology, particularly smartphone usage, has brought significant changes to daily life, including students' social interaction patterns. Smartphones provide benefits by facilitating communication and expanding social connections through digital platforms. However, excessive use may reduce direct interactions within the surrounding environment. This study aimed to examine the influence of smartphone usage on Grade X students' social interaction. This research employed a quantitative approach using a survey method and was conducted at Karya Bahana Mandiri 2 Vocational High School. The sample consisted of 74 students selected from a population of 90 students using the Yamane formula with a 5% error rate. Data were collected through observation and questionnaires. The results showed a simple linear regression equation of $y = 11.704 + 0.623x$. The correlation coefficient value of 0.613 indicated a strong relationship between smartphone usage and students' social interaction. The coefficient of determination of 37.6% indicated that smartphone usage contributed to students' social interaction, while the remaining 62.4% was influenced by other factors not examined in this study. The hypothesis testing results showed that the t-value (6.582) was greater than the t-table value (1.993), with a significance value of $0.00 < 0.05$. Therefore, it can be concluded that smartphone usage has a significant influence on students' social interaction.

Keywords: *smartphone usage, social interaction, students, adolescents.*

ABSTRAK

Perkembangan teknologi, khususnya penggunaan smartphone, telah membawa perubahan dalam kehidupan sehari-hari, termasuk pada pola interaksi sosial peserta didik. Smartphone memberikan manfaat dalam mempermudah komunikasi dan memperluas hubungan sosial melalui media digital. Namun, penggunaan yang berlebihan juga dapat mengurangi intensitas interaksi secara langsung di lingkungan sekitar. Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan smartphone terhadap interaksi sosial peserta didik kelas X. Penelitian menggunakan pendekatan kuantitatif dengan metode survei dan dilaksanakan di SMK Karya Bahana Mandiri 2. Sampel penelitian berjumlah 74 siswa dari total populasi 90 siswa yang ditentukan menggunakan rumus Yamane dengan tingkat kesalahan 5%. Data dikumpulkan melalui observasi dan penyebaran angket. Hasil penelitian menunjukkan persamaan regresi linear sederhana sebesar $y = 11,704 + 0,623x$. Nilai koefisien korelasi sebesar 0,613 menunjukkan adanya hubungan yang kuat antara penggunaan smartphone dan interaksi sosial peserta didik. Koefisien determinasi sebesar 37,6% menunjukkan bahwa penggunaan smartphone memberikan kontribusi terhadap interaksi sosial peserta didik, sedangkan 62,4% dipengaruhi oleh faktor lain di luar penelitian. Hasil uji hipotesis menunjukkan nilai t hitung sebesar 6,582 lebih besar dibandingkan t tabel 1,993 dengan nilai signifikansi $0,00 < 0,05$, sehingga dapat disimpulkan bahwa penggunaan smartphone berpengaruh secara signifikan terhadap interaksi sosial peserta didik.

Keywords: *smartphone; penggunaan smartphone; interaksi sosial; peserta didik.*

Introduction

The rapid development of digital technology has brought significant changes to various aspects of human life, particularly in communication, education, and social interaction. Technological advancement has become increasingly integrated

into everyday activities, especially among adolescents and students who are highly familiar with internet-based communication and digital media. One of the technological devices most widely used today is the smartphone. Initially, smartphones were mainly used as communication tools, but over time they have evolved into multifunctional devices that provide access to information, entertainment, social networking, and educational resources. Fortunati (2023) explained that smartphones have become an inseparable part of modern society because they influence how individuals communicate, interact, and carry out daily activities.

Among various social groups, students are considered one of the most active smartphone users. In daily life, smartphones are commonly used by students to communicate with friends and family, access social media, search for academic information, participate in online learning, and complete school assignments. The convenience and accessibility offered by smartphones allow students to obtain information quickly and maintain communication without limitations of time and distance. Islamiah et al. (2024) stated that smartphone usage has become closely related to changes in adolescents' social behavior and communication habits in everyday life.

The increasing use of smartphones among students has created both positive and negative impacts. On the positive side, smartphones help students communicate more efficiently, support collaborative learning, and broaden access to educational information. Students can participate in online discussions, exchange learning materials, and maintain social relationships through digital communication platforms. Smartphones also support independent learning because students can access educational resources more easily. Nikolopoulou (2020) explained that mobile devices in educational environments may provide benefits for communication and learning activities when used appropriately.

Despite these advantages, excessive smartphone usage may also influence students' social behavior and interpersonal relationships. Many students spend considerable time using smartphones for entertainment, social media, online games, and digital communication activities. Continuous engagement with smartphones may reduce opportunities for direct face-to-face interaction and affect communication quality in real-life situations. Bai et al. (2024) found that excessive smartphone usage among adolescents may contribute to behavioral dependency and changes in communication patterns. Similarly, Girela-Serrano et al. (2024) explained that uncontrolled use of smartphones and digital devices may affect adolescents' emotional wellbeing, communication habits, and social relationships.

Social interaction is an important aspect of students' personal and social development. Humans naturally require communication and interaction with others to build relationships, exchange ideas, and develop emotional

understanding. In educational environments, positive social interaction helps students improve communication skills, empathy, cooperation, and self-confidence. Through interaction with peers, students learn how to adapt socially, solve problems collaboratively, and build healthy interpersonal relationships. Kurowicka (2020) emphasized that communication plays an essential role in educational processes because it supports students' social and emotional development. Priadi (2020) also explained that effective communication contributes to the quality of interaction and learning environments among students and teachers.

Social interaction does not only involve verbal communication but also includes emotional expression, cooperation, openness, empathy, and mutual understanding among individuals. Good social interaction may create a positive social environment that supports students' academic and emotional growth. However, communication patterns among adolescents have gradually changed due to the increasing use of smartphones and digital communication platforms. Many students currently prefer communicating through social media and online messaging applications rather than interacting directly with people around them.

One phenomenon closely related to smartphone usage is *phubbing*, which refers to behavior in which individuals ignore people around them because they are more focused on their smartphones. This phenomenon has become increasingly common among adolescents and students. During conversations or social activities, some students pay more attention to smartphone activities than to direct communication with others. Kelly et al. (2019) explained that smartphone-related interruptions during conversations may influence communication quality and interpersonal relationships. Similarly, Arimar and Wirtati (2024) found that phubbing behavior caused by excessive smartphone usage could reduce students' social engagement and direct interaction within social environments.

The increasing dependence on smartphones may also influence students' emotional and social wellbeing. Li et al. (2023) found that smartphone addiction among university students was associated with loneliness and reduced social functioning. Excessive smartphone usage may limit students' participation in direct social activities and reduce emotional involvement during communication. In addition, prolonged smartphone use may gradually influence students' communication habits because digital interaction becomes more dominant than face-to-face interaction.

Several previous studies have examined the relationship between smartphone usage and students' social interaction. Social interaction plays an essential role in the educational process because it enables students to communicate, exchange ideas, cooperate with peers, and build interpersonal relationships that support learning activities. Effective communication is considered one of the key elements in fostering positive social interaction and student participation in educational

settings (Kurowicka, 2020; Priadi, 2020). Tang (2025) explained that smartphone usage influences students' social wellbeing and communication patterns in educational settings. Ombayan et al. (2025) also reported that excessive phone use during social interaction may create communication barriers and reduce students' attention toward people around them. These findings indicate that smartphone usage has become one of the important factors influencing adolescents' social interaction in the digital era.

Although previous studies have examined the relationship between smartphone usage and social interaction among adolescents, several gaps remain. Most existing studies have focused on smartphone addiction, problematic smartphone use, or phubbing behavior, emphasizing the negative consequences of smartphone use. Consequently, limited attention has been given to understanding how general smartphone usage may influence students' social interaction in both positive and negative ways. In addition, previous findings remain inconsistent. Some studies reported that excessive smartphone use reduces face-to-face interaction and social engagement, whereas others found that smartphones facilitate communication and strengthen social connectivity. Furthermore, studies conducted in Indonesian vocational high school settings are still relatively limited. Therefore, this study seeks to examine the influence of smartphone usage on the social interaction of Grade X students at Karya Bahana Mandiri 2 Vocational High School.

Based on preliminary observations conducted by the researcher, the social interaction of Grade X students at Karya Bahana Mandiri 2 Vocational High School was still relatively low. Some students were often seen using smartphones during break times and social situations rather than communicating directly with their peers. Some students were also less active during classroom discussions and group interaction activities. These conditions indicate a possible relationship between smartphone usage intensity and students' social interaction patterns.

Considering these issues, research regarding the influence of smartphone usage on students' social interaction is important to conduct. This study aims to examine whether smartphone usage significantly influences students' social interaction. The findings are expected to provide a deeper understanding of how smartphone usage affects students' communication and social interaction patterns and may serve as useful references for schools, parents, and students in encouraging balanced and responsible smartphone usage without reducing the importance of direct social interaction in everyday life.

Based on the research gap and preliminary observations, the research question addressed in this study is: "Does smartphone usage significantly influence the social interaction of Grade X students at Karya Bahana Mandiri 2 Vocational High

School?” Accordingly, this study proposes the hypothesis that smartphone usage has a significant influence on students’ social interaction.

Research Methods

This study employed a quantitative approach with a survey method to investigate the influence of smartphone usage on students’ social interaction. The quantitative approach was selected because the study focused on measuring and analyzing the relationship between variables using numerical data and statistical procedures. Quantitative research is widely used in educational research to identify patterns, relationships, and influences among variables through objective measurement. According to Sugiyono (2018), quantitative research is based on the philosophy of positivism and is used to examine specific populations or samples through systematic data collection and statistical analysis. Through this approach, the researcher was able to identify the extent to which smartphone usage influenced students’ social interaction.

The survey method was applied because it allowed the researcher to obtain information directly from respondents regarding their smartphone usage behavior and social interaction patterns. Survey research is considered effective in collecting data from a relatively large number of participants within a limited period of time. In addition, this method enabled the researcher to gather factual information regarding students’ experiences, habits, and behaviors related to smartphone usage in their daily lives. The use of a survey method also supported the objective of the study in describing and analyzing the relationship between the independent and dependent variables systematically.

The research was conducted at Karya Bahana Mandiri 2 Vocational High School involving Grade X students as the research participants. This school was selected because smartphone usage among students was considered relatively high and had become part of students’ daily activities, both inside and outside the classroom. Preliminary observations conducted by the researcher also indicated that some students tended to spend more time using smartphones than engaging in direct social interaction with their peers. These conditions encouraged the researcher to examine the influence of smartphone usage on students’ social interaction more deeply.

The population of this study consisted of 90 Grade X students at Karya Bahana Mandiri 2 Vocational High School. The sample size was determined using the Yamane formula with a 5% margin of error as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, and e is the margin of error.

$$n = \frac{90}{1 + 90(0.05)^2} = 73.47$$

The result was rounded up to 74 respondents. The respondents were selected using a simple random sampling technique, which provided each member of the population with an equal opportunity to be included in the study. The sample was considered representative of the population and adequate for the statistical analyses conducted in this research.

Data collection in this study was carried out through observation and questionnaires. Observation was conducted to obtain a direct overview of the school environment and students' interaction patterns during school activities. Through observation, the researcher was able to identify how students communicated, interacted, and responded to their peers in social situations. Observation also helped the researcher understand the actual conditions related to smartphone usage among students in the school environment.

In addition to observation, questionnaires were used as the main instrument for collecting research data. The questionnaires contained statements related to smartphone usage and students' social interaction. Respondents were asked to provide answers based on their own experiences and behaviors. The questionnaire instrument used a Likert scale with five response categories, namely strongly agree, agree, neutral, disagree, and strongly disagree. The Likert scale was chosen because it allowed respondents to express their opinions and perceptions more clearly and systematically.

This study involved two research variables. Smartphone usage was identified as the independent variable (X), while students' social interaction was identified as the dependent variable (Y). Smartphone usage in this study referred to the intensity and pattern of smartphone use among students in their daily activities. Meanwhile, social interaction referred to students' communication, cooperation, openness, empathy, and interaction with others in the school environment.

Table 1. Operational Definition of Research Variables

Variable	Dimension	Indicator
Smartphone Usage (X)	Frequency	The frequency of smartphone use in daily activities
	Duration	The amount of time spent using smartphones each day
	Content	The types of content and activities accessed through smartphones
Social Interaction (Y)	Interaction Time	The amount of time spent interacting with others
	Interaction Intensity	The frequency and closeness of social interaction
	Conversation	Verbal communication and exchange of ideas with others
	Openness	Willingness to share information, opinions, and feelings with others

The independent variable in this study was smartphone usage, which was measured through three indicators: frequency, duration, and content of smartphone use. The dependent variable was social interaction, which was measured through four indicators: interaction time, interaction intensity, conversation, and openness. These indicators were used as the basis for developing the questionnaire items administered to the respondents.

1.1 Research Instrument

The research instruments were developed by the researcher in the form of questionnaires. The questionnaires employed a five-point Likert scale consisting of strongly agree (SA), agree (A), neutral (N), disagree (D), and strongly disagree (SD). The response categories were scored 5, 4, 3, 2, and 1, respectively, for positive statements. For negative statements, the scoring was reversed. The blueprint of the smartphone usage questionnaire and social interaction questionnaire is presented in the following tables.

Table 2. Blueprint of Smartphone Usage Questionnaire

No	Indicator	Item Number	Total Item
1.	Frequency	1,2*,5,8,9,12,13,15,18,19,21,22,25	13
2.	Duration	3,6,10,11,14*,16,20,23,26,30	10
3.	Content	4,7,17*,24,27,28,29	7
			30

Note: () indicates negative statements*

Source: Developed by the researcher (2025).

Table 3. Blueprint of Social Interaction Questionnaire

No	Indicator	Item Number	Total Item
1.	Interaction Time	2,4,8*,13,20,22,25,27,30	9
2.	Interaction Intensity	16,19,17,23*,24,26,28,29	8
3.	Conversation	1,7,9*,11,15,18,21	7
4.	Openness	3,5*,6,10,12,14	6
			30

Note: () indicates negative statements*

Source: Developed by the researcher (2025).

1.2 Instrument Validity and Reliability

Prior to data collection, validity and reliability testing were conducted to ensure the quality of the research instruments. The validity test was performed using the Pearson Product-Moment correlation technique. The validity test results indicated that 21 out of 30 items in the smartphone usage questionnaire and 17 out of 30 items in the social interaction questionnaire met the validity criterion ($r\text{-count} > r\text{-table} = 0.444$). Therefore, only the valid items were retained and used in the subsequent data collection and analysis.

Reliability testing was conducted using Cronbach's Alpha coefficient. The smartphone usage instrument obtained a Cronbach's Alpha value of 0.878, while the social interaction instrument obtained a value of 0.851. Since both coefficients exceeded the minimum acceptable threshold of 0.70, the instruments were considered reliable and suitable for data collection.

Table 4. Summary of Instrument Validity and Reliability Testing

Variable	Total Items	Valid Items	Cronbach's Alpha	Interpretation
Smartphone Usage	30	21	0.878	Reliable
Social Interaction	30	17	0.851	Reliable

Source: Developed by the researcher (2025)

Based on the validity and reliability testing results, both instruments were considered appropriate for measuring smartphone usage and social interaction among students.

The collected data were analyzed using several statistical techniques. Simple linear regression analysis was conducted to determine the influence of smartphone usage on students' social interaction. Correlation coefficient analysis was used to identify the strength of the relationship between the two variables, while the coefficient of determination analysis was conducted to measure the contribution of smartphone usage to students' social interaction. Furthermore, hypothesis testing using the t-test was carried out to determine whether the influence of smartphone

usage on students' social interaction was statistically significant. Through these analytical procedures, the researcher was able to draw conclusions regarding the relationship between smartphone usage and students' social interaction.

Results and Discussion

Research Results

Based on the data that had been collected, recapitulated, processed, and analyzed, the researcher examined the influence of smartphone usage on students' social interaction.

1.1 Simple Linear Regression

This analysis was conducted to determine the functional relationship between smartphone usage and students' social interaction. The results of the calculation using SPSS 26 are presented in Table 1.

Table 5. Simple Linear Regression Equation Calculation

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	t
1	(Constant)	11.704	6.820		1.716
	Penggunaan Smartphone	.623	.095	.613	6.582

a. Dependent Variable: Interaksi Sosial

Source: Developed by the researcher (2025)

The equation explains the relationship between smartphone usage and students' social interaction. The constant value of 11.704 indicates that students already have a certain level of social interaction even when smartphone usage is considered unchanged. This means that social interaction is not only influenced by smartphone usage, but also by other factors such as family environment, friendships, communication habits, and activities at school.

Meanwhile, the regression coefficient value of 0.623 shows that every increase in smartphone usage is followed by an increase in students' social interaction scores. Since the coefficient value is positive, it indicates that smartphone usage has a positive relationship with students' social interaction. In other words, smartphones can help students communicate more easily, share information, and maintain interaction with friends and classmates.

These findings show that smartphones are not always associated with negative impacts on students' social lives. In today's digital era, smartphones have become part of students' daily communication activities. Many students use smartphones to communicate through social media, discussion groups, and online

messaging applications. Through these platforms, students can stay connected with others, exchange information related to school activities, and maintain social relationships even outside the classroom.

However, smartphone usage still needs to be used wisely and in a balanced way. Although smartphones can support communication and interaction, excessive usage may reduce direct face-to-face communication among students. Therefore, students are expected to use smartphones appropriately so that technology can provide positive benefits without reducing the quality of social interaction in everyday life.

1.2 Correlation Coefficient Analysis

The correlation coefficient analysis was used to determine the strength of the relationship between smartphone usage and students’ social interaction. The calculation results using SPSS 26 are presented below.

Table 6. Correlation Coefficient and Coefficient of Determination Calculation

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.613 ^a	.376	.367	8.11162

a. Predictors: (Constant), Penggunaan Smartphone

Source: Processed research data (2025)

Based on Table 2, the correlation coefficient value was 0.613, indicating a strong relationship between smartphone usage and students’ social interaction. This finding shows that smartphone usage is closely related to the way students communicate and interact with others in their social environment. The positive correlation value suggests that smartphone usage may influence students’ interaction patterns, both in direct communication and digital communication activities.

The results also indicate that smartphones have become an important part of students’ daily social lives. Many students use smartphones not only for entertainment purposes but also for communicating with friends, participating in group discussions, exchanging information, and maintaining social relationships. Through social media applications and online communication platforms, students can stay connected with others more easily and quickly.

However, although the relationship between smartphone usage and social interaction was categorized as strong, smartphone usage should still be managed wisely. Excessive smartphone usage may reduce students’ involvement in direct face-to-face interaction and decrease communication quality in real-life situations.

Therefore, maintaining balance between digital communication and direct social interaction is important to support healthy social relationships among students.

1.3 Coefficient of Determination Analysis

The coefficient of determination analysis was conducted to measure how much smartphone usage contributed to students' social interaction. Based on Table 2, the coefficient of determination value was 0.376 or 37.6%. This result indicates that smartphone usage contributed 37.6% to students' social interaction patterns. In other words, smartphone usage had a fairly meaningful role in influencing how students communicate and interact with people around them.

Meanwhile, the remaining 62.4% was influenced by other factors that were not included in this study. These factors may include family environment, peer relationships, communication habits, personality, school environment, and students' daily social activities. The findings suggest that although smartphone usage plays an important role in students' social interaction, it is not the only factor affecting students' social behavior and communication patterns.

This result also shows that social interaction among students is influenced by various conditions and experiences in their everyday lives. Therefore, maintaining healthy social interaction requires not only wise smartphone usage but also support from family, school, and the surrounding social environment.

1.4 Hypothesis Testing

a. Hypothesis Formulation

$H_0: \rho = 0$ There is no influence of smartphone usage on students' social interaction.

$H_a: \rho \neq 0$ There is an influence of smartphone usage on students' social interaction.

b. Determining the t-table Value

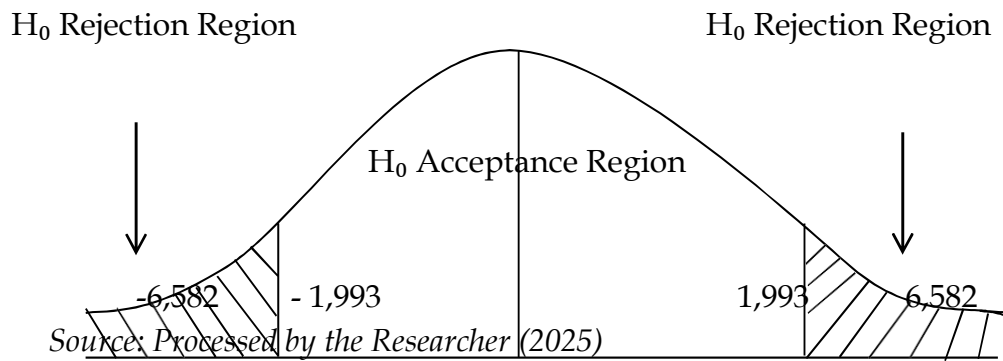
The significance level used in this study was $\alpha = 5\%$ or 0.05 with a two-tailed test and a degree of freedom (df) of $n - 2 = 74 - 2 = 72$. Based on the calculation, the t table = 1,993.

c. Testing Criteria

H_0 is accepted and H_1 is rejected if the t-value is less than the t-table value ($t\text{-count} < t\text{-table}$).

H_0 is rejected and H_1 is accepted if the t-value is greater than the t-table value ($t\text{-count} > t\text{-table}$).

Figure 1. Acceptance and Rejection Regions of the t-test



Discussion

The results of this research showed that smartphone usage had a positive and significant influence on students' social interaction. Hypothesis testing indicated that the calculated t-value was higher than the t-table value, with a significance value lower than 0.05. These results indicate that smartphones play an important role in shaping students' communication patterns and interaction habits in everyday life. In the current digital era, smartphones have become closely connected to students' daily activities, particularly for communication, information sharing, entertainment, and educational purposes.

The positive influence identified in this study may be explained by the way students utilize smartphones in their daily activities. Based on the questionnaire indicators, smartphone usage among students was reflected through frequency, duration, and content of use. Most students use smartphones not only for entertainment purposes but also for communication, information sharing, and academic activities. Therefore, smartphones function as tools that facilitate interaction rather than replace social relationships. This condition may explain why higher smartphone usage was associated with better social interaction among the respondents.

Smartphones may provide positive contributions to students' social interaction when used appropriately. Many students use smartphones to communicate with classmates, discuss school assignments, exchange information, and maintain relationships through social media and messaging applications. Digital communication platforms also allow students to stay connected with friends even outside school environments. This condition shows that smartphones can support communication effectiveness and strengthen social connectivity among students. This result is also supported by evidence showing that adolescents often use digital communication platforms to maintain social experiences and peer relationships. Social media interactions may help adolescents remain connected with their friends and support their sense of social belonging

(Armstrong-Carter et al., 2023).

This finding is consistent with several previous studies that highlighted the important role of smartphones in adolescents' communication and interaction patterns. Smartphones have transformed modern communication practices and become essential tools in social life, enabling adolescents to exchange information, maintain relationships, and engage in social activities more efficiently (Fortunati, 2023; Islamiah et al., 2024; Tang, 2025). Within educational environments, smartphone usage may also support collaborative learning by facilitating communication and discussion among students through various digital platforms. Therefore, smartphones can contribute positively to students' social interaction when used appropriately and responsibly.

Ombayan et al. (2025) reported that smartphones have become dominant tools in adolescents' social interaction. Applications such as WhatsApp, Instagram, and other social networking platforms are commonly used by students to maintain friendships and social engagement. This condition indicates that smartphones are no longer viewed only as communication devices but have gradually become part of students' social lifestyles.

The findings suggest that smartphone usage supports both online and offline social interaction. Through messaging applications and social networking platforms, students can maintain communication beyond school hours. At the same time, these digital interactions may strengthen existing friendships and facilitate face-to-face communication when students meet in school settings. Thus, smartphone usage does not necessarily replace direct interaction but may complement students' social relationships. This finding is consistent with studies suggesting that digital communication technologies may strengthen social connectedness when used appropriately. Social connectedness has been identified as an important factor linking smartphone use and adolescents' psychological and social adjustment (Yıldırım et al., 2024).

This finding is also supported by recent studies suggesting that digital communication platforms may strengthen adolescents' social connectedness when used in a balanced and purposeful manner. Social media and mobile communication technologies can facilitate relationship maintenance, information exchange, and social support, thereby helping adolescents remain connected with their peers beyond face-to-face interactions. Furthermore, digital platforms may reduce feelings of loneliness and enhance social connection among young people when used appropriately (McAlister et al., 2024).

Despite the positive influence identified in this study, excessive smartphone use may also create negative consequences for students' social interaction. One phenomenon associated with excessive smartphone use is phubbing, where individuals pay more attention to their smartphones than to people around them.

Previous studies have shown that intensive smartphone use may reduce communication quality, social engagement, and emotional involvement in interpersonal interactions (Kelly et al., 2019; Arimar & Wirtati, 2024; Bai et al., 2024). Students who spend excessive time using smartphones may become less responsive during face-to-face communication and less active in social activities.

Another important result in this research was that smartphone usage contributed 37.6% to students' social interaction, while the remaining 62.4% was influenced by other factors outside the scope of this study. The coefficient of determination ($R^2 = 0.376$) indicates that smartphone usage explained 37.6% of the variance in students' social interaction. This finding suggests that smartphone usage is an important predictor of social interaction; however, social interaction is a multidimensional phenomenon that is also shaped by family environment, friendship quality, personality, communication habits, emotional conditions, and the school environment.

Changes in adolescents' communication habits can also be observed through the increasing use of digital communication platforms. Many students currently prefer communicating through online messaging applications and social media because these forms of communication are considered faster and more practical. Several studies have reported that excessive smartphone use may influence adolescents' communication patterns and social functioning. Smartphone dependency has been associated with reduced participation in direct social activities, changes in communication behavior, loneliness, and decreased social responsiveness (Li et al., 2023; Nawaz et al., 2025; Zhou et al., 2025; Sarman et al., 2024). Excessive engagement with digital devices may encourage students to rely more heavily on online communication than face-to-face interaction, which can gradually affect the quality of interpersonal relationships.

Recent studies have also highlighted the broader influence of smartphone behavior on students' academic and social life. Hsieh (2025) explained that the frequency of smartphone usage may influence students' academic performance and daily learning activities. Intensive smartphone use may affect students' concentration, time management, and communication behavior, particularly when students spend excessive time accessing social media and digital entertainment. Although smartphones can support educational activities, uncontrolled usage may gradually reduce students' focus and participation in direct interaction within learning environments.

A similar finding was reported by Ma'ruf et al. (2024), who stated that social media usage, internet access, and mobile device penetration significantly influenced the quality of adolescents' social interaction in Indonesia. The study showed that digital communication platforms have become part of adolescents' everyday social activities and communication patterns. Students currently tend to

rely on smartphones not only for communication purposes but also for maintaining friendships, accessing information, and building online social engagement.

Previous studies have also highlighted the relationship between smartphone usage and adolescents' wellbeing. Excessive smartphone engagement may influence emotional conditions, social participation, interpersonal communication, and overall wellbeing. Furthermore, prolonged screen time has been associated with mental health concerns, social isolation, and reduced face-to-face interaction among adolescents (Girela-Serrano et al., 2024; Alharbi et al., 2025; Kornienko & Pérez, 2025).

Within educational environments, smartphones may provide both opportunities and challenges for students' communication and learning activities. While smartphones facilitate access to information and communication, excessive attention to mobile devices during social situations may reduce interaction quality and interpersonal engagement (Kelly et al., 2019; Knausenberger et al., 2022).

Previous studies have reported that problematic smartphone use may affect communication quality, concentration, and participation in educational environments. Students who rely heavily on smartphones may become less active in classroom discussions and group interaction activities (Nawaz et al., 2025; Zhou et al., 2025). Similar findings were reported by Prasetyo et al. (2021), who found that smartphone usage influenced students' interaction behavior and communication habits in school environments.

The findings of this study differ from several previous studies that reported negative consequences of smartphone use, such as social isolation, reduced communication quality, and smartphone dependency. One possible explanation is that this study measured general smartphone usage rather than problematic smartphone use or smartphone addiction. While excessive and uncontrolled smartphone use may negatively affect social interaction, moderate and purposeful smartphone use may facilitate communication, information exchange, and social engagement among students. Therefore, the impact of smartphone usage may depend on how the technology is utilized rather than on smartphone ownership itself.

Overall, smartphones have both positive and negative influences on students' social interaction. Smartphones may support communication, collaboration, and social engagement when used wisely and responsibly. At the same time, excessive smartphone usage may reduce face-to-face interaction and influence communication quality in real-life situations. Therefore, students need to maintain balanced smartphone usage in order to gain positive benefits from technology without reducing the importance of healthy direct social interaction in everyday life.

Conclusion

Based on the results of the study, it can be concluded that smartphone usage had a positive and significant influence on the social interaction of Grade X students at Karya Bahana Mandiri 2 Vocational High School, Bekasi City. The findings indicate that smartphone usage plays an important role in shaping students' daily communication and social interaction patterns. Students commonly use smartphones to communicate, exchange information, and maintain relationships with their peers both inside and outside the school environment.

The study also showed that smartphone usage contributed 37.6% to students' social interaction, indicating that smartphones can support communication and social connectivity when used appropriately. However, excessive smartphone usage may reduce the quality of face-to-face interaction and limit students' involvement in direct social communication. Therefore, students are encouraged to use smartphones responsibly and maintain a balance between digital communication and real-life social interaction.

Theoretically, this study contributes to the growing body of knowledge regarding the role of digital technology in shaping adolescents' social interaction. The findings suggest that smartphone usage does not always lead to negative social outcomes, but may also facilitate communication and social engagement when used purposefully. Practically, the findings may serve as useful references for schools, teachers, and parents in promoting responsible smartphone usage while encouraging healthy interpersonal relationships among students.

This study has several limitations. First, the research was conducted in only one vocational high school, which may limit the generalizability of the findings. Second, the study focused solely on smartphone usage as a predictor of social interaction, whereas other factors such as family environment, peer relationships, personality, and school climate may also influence students' social interaction. Therefore, future studies are encouraged to examine additional variables such as family communication, peer influence, digital literacy, and social media engagement to obtain a more comprehensive understanding of students' social interaction.

Suggestions

For Teachers and Schools

Teachers and schools are encouraged to integrate smartphone usage into learning activities that promote cooperation and students' social interaction, such as digital group projects, online discussions, and application-based collaborative learning. In addition, education regarding digital media ethics should continuously be provided to students.

For Students

Students are expected to use smartphones wisely and productively, especially to strengthen communication, collaboration, and social engagement with peers and teachers. The use of applications such as study groups, discussion forums, and educational social media can support healthy social interaction.

For Parents

Parents are expected to provide guidance and supervision regarding their children's smartphone usage at home while also allowing them to use technology positively to expand their social networks. Open communication regarding the benefits and risks of smartphone usage should be carried out regularly.

For Future Researchers

Future researchers are encouraged to expand this study by considering other factors that may influence social interaction, such as family communication intensity, students' personalities, or the types of applications used. Qualitative research may also be conducted to explore more deeply the forms of social interaction developed through digital media.

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