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Enhancing Learning Quality via Teacher Satisfaction with WhatsApp Usage in Teaching at SMA Laboratorium UPGRIS Semarang

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ABSTRACT

This study aims to examine the effect of using WhatsApp as a learning medium on teacher satisfaction at SMA Laboratorium UPGRIS Semarang. The research employs a quantitative approach with a survey method. Data were collected through questionnaires distributed to teachers, and analyzed using simple linear regression. The findings reveal a significant and positive influence of WhatsApp usage on teacher satisfaction. The regression analysis shows a significance value of 0.001 ($p < 0.05$) with a regression coefficient of 0.684, indicating that improved use of WhatsApp leads to increased teacher satisfaction. The R-squared value of 0.627 suggests that 62.7% of the variance in teacher satisfaction is explained by the use of WhatsApp. Additionally, the analysis of learning quality through four indicators clarity of materials, student engagement, communication effectiveness, and learning management shows that WhatsApp is perceived as effective in supporting the learning process. These results indicate that WhatsApp can be a practical and accessible tool to enhance both the quality of learning and professional satisfaction of teachers in the digital era.

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1. Introduction

The rapid development of digital technology in the modern era has fundamentally transformed various aspects of human life, including the field of education. The Indonesian government has emphasized the integration of information and communication technology (ICT) in learning, as reflected in the Ministry of Education, Culture, Research, and Technology Regulation (Permendikbudristek) No. 40 of 2021 on the Implementation of ICT in Education. This regulation encourages schools and teachers to optimize digital platforms to enhance the quality of learning and ensure equal access to education.

The use of digital technology, particularly mobile applications and social media, has become a necessity in supporting teaching and learning processes. Among various platforms, WhatsApp has emerged as one of the most popular communication tools in Indonesia due to its accessibility, user-friendly features, and wide adoption across age groups. During the COVID-19 pandemic, WhatsApp became one of the main media chosen by teachers to maintain the continuity of education (Putri et al., 2022; Pratama & Wardani, 2023). This platform allows teachers to deliver learning materials, share assignments, provide feedback, and maintain interaction with students in real time.

Despite its advantages, several studies indicate that the use of WhatsApp as a learning medium still faces challenges, such as limited monitoring of students' engagement, difficulty in assessing learning outcomes effectively, and constraints in documenting teaching materials (Sari & Nugroho, 2022; Nurhayati et al., 2023). Furthermore, the level of teacher satisfaction plays a crucial role in determining the sustainability and effectiveness of WhatsApp-based learning. Teacher satisfaction is closely related to ease of use, perceived usefulness, and its impact on improving learning quality (Dewi & Kurniawan, 2024).

At the national level, the government has launched programs to improve teacher competence in utilizing ICT through the Digital Learning Transformation initiative. However, in practice, there is a variation in teachers' perceptions and satisfaction regarding WhatsApp use, particularly in supporting pedagogical effectiveness, communication with students, and administrative tasks.

In SMA Laboratorium UPGRIS Semarang, WhatsApp has been widely used as a supporting medium for teaching and learning. However, preliminary observations indicate that teachers experience difficulties related to documentation, assessment, and task management through WhatsApp. This raises questions about the extent to which teachers are satisfied with WhatsApp as a learning medium and how this satisfaction affects the quality of learning.

Therefore, this study is essential to analyze teacher satisfaction with the use of WhatsApp as a learning medium and its relationship with improving the quality of learning in SMA Laboratorium UPGRIS Semarang. The findings are expected to provide empirical evidence that supports policy development and innovation in digital-based learning strategies, aligned with the government's efforts to promote effective and inclusive digital education.In this section, provide an adequate background of the study and add the current researches to show the gap of the research.

2. Literature Review

2.1 WhatsApp as a Learning Medium

Teacher satisfaction plays a significant role in determining educational performance because it is closely linked to motivation, commitment, and the quality of learning outcomes (Han & Yin, 2021). One of the widely recognized frameworks for understanding teacher satisfaction is Herzberg's Two-Factor Theory (1959), which categorizes satisfaction factors into motivator (intrinsic) factors and hygiene (extrinsic) factors.

Motivator factors consist of achievement, recognition, responsibility, meaningful work, and opportunities for professional growth, which directly enhance job satisfaction and performance (Judge et al., 2020). Conversely, hygiene factors include working conditions,

organizational policies, interpersonal relationships, and financial rewards. Although these factors may not increase satisfaction when present, their absence often leads to dissatisfaction (Akgunduz et al., 2020).

In the context of this research, using WhatsApp as a learning medium aligns with motivator factors because it promotes learning innovation, offers new teaching experiences, and enables efficient communication (Rambe & Bere, 2023). When the platform is user-friendly and provides tangible benefits for the teaching process, teachers are more likely to feel satisfied and motivated in their instructional practices (Lestari et al., 2021).

Furthermore, Vroom's Expectancy Theory (1964) emphasizes that satisfaction and motivation depend on three core components: expectancy, instrumentality, and valence. Teachers who believe that using WhatsApp will improve learning effectiveness (expectancy), perceive benefits such as simplified communication and enhanced interaction quality with students (instrumentality), and view these benefits as highly valuable (valence) are more likely to exhibit higher satisfaction when using the platform as a learning medium (Mailizar & Fan, 2020; Khlaif et al., 2023). Recent studies also highlight that mobile instant messaging tools like WhatsApp enhance teacher collaboration and instructional flexibility, factors that positively influence job satisfaction and professional commitment (Bozkurt & Sharma, 2023; Alamri et al., 2024).

2.2 Learning Media

Learning media refer to various forms and channels used to convey information and deliver instructional messages effectively (Heinich et al., 2002). Mayer (2009) emphasizes that learning becomes more effective when combining words and pictures because the human brain processes information through two main channels: verbal and visual. The integration of multimedia elements in learning media enhances students' ability to process information and improves learning outcomes (Clark & Mayer, 2016; Aloraini, 2020).

Learning media have evolved significantly in the digital era, providing opportunities for interactive, flexible, and technology-enhanced learning experiences. According to Dhawan (2020), digital learning media facilitate independent and collaborative learning while supporting different learning styles. Similarly, Bervell and Arkorful (2020) highlight that online and mobile-based media enhance accessibility and continuity of learning, particularly during situations requiring remote education, such as the COVID-19 pandemic.

2.2.1 Characteristics of Learning Media

Learning media generally possess several key characteristics:

1. Presenting information concretely, which helps students comprehend abstract concepts (Sadiman et al., 2020).
2. Enabling interactivity, allowing two-way communication and active learner engagement (Aisyah et al., 2022).
3. Being easily accessible and affordable, ensuring users can utilize them anytime and anywhere (Bervell & Arkorful, 2020).
4. Aligning with instructional objectives to effectively support desired learning outcomes (Clark & Mayer, 2016).

2.2.2 Implications for WhatsApp Use

WhatsApp can be categorized as technology-based learning media that supports multimedia learning because it facilitates the transmission of text, images, audio, and video (Bouhnik & Deshen, 2014). It also supports real-time interaction, such as discussions, question-and-answer sessions, and feedback, which fosters knowledge construction and improves student engagement (Misaghi et al., 2021; Nagaletchimee et al., 2024). In addition, the use of WhatsApp as a learning medium aligns with the increasing demand for mobile learning solutions that emphasize flexibility, accessibility, and social interaction (Bervell & Arkorful, 2020; Durgungoz & Durgungoz, 2022).

2.3 WhatsApp as a Learning Medium

WhatsApp is an instant messaging application widely used globally, including in educational contexts. Its popularity stems from free access, intuitive interface, and support for real-time communication (Church & de Oliveira, 2013). It has been adopted as a key tool during remote and blended learning phases, especially during and after the COVID-19 pandemic.

2.3.1 Characteristics of WhatsApp

1. Accessible across devices such as smartphones, tablets, and laptops via WhatsApp Web.
2. Supports diverse multimedia features: text, images, audio, video, document sharing, voice calls, and video calls.
3. Enables both individual and group communication; teachers can form class groups for discussions, material sharing, and learning coordination.

2.3.2 Advantages of WhatsApp in Learning

1. Offers flexibility of place and time, allowing teachers and students to engage in learning activities anytime.
2. Facilitates collaboration, peer discussion, and group activities, thus enhancing social presence and interaction (Misaghi et al., 2021)
3. Cost-effective, requiring only internet access and eliminating costs of SMS or voice calls.

2.3.3 Limitations of WhatsApp

1. May distract learners—non-academic messages can interrupt focus.
2. Teachers may struggle to centrally monitor or track all student participation in large groups.
3. Offers limited media variation and features compared to full Learning Management Systems (LMS).

2.3.4 Recent Empirical Evidence

1. Rahmawati et al. (2021) report that WhatsApp accelerates material distribution and enables instant feedback, significantly boosting student engagement in ESP learning (Pratiwi & Wijayanti, 2025)

2. Misaghi et al. (2021) find that WhatsApp fosters both synchronous and asynchronous communication, bridges social presence, and supports learner autonomy in distance education.
3. A mixed-methods study by Nagaletchimee et al. (2024) shows improved social and cognitive presence among ESL learners using WhatsApp, leading to higher engagement and enhanced learning quality
4. Durgungoz & Durgungoz (2022), in a mathematics-teaching project, observe that WhatsApp-based classes increased learner motivation and time investment—though teachers reported higher workload, mitigated by institutional support.

2.4 Learning Quality

Learning quality encompasses all aspects influencing the effectiveness of learning processes and outcomes. According to Darling-Hammond et al. (2020), learning quality can be measured through dimensions of planning, implementation, and learning outcomes. Recent studies emphasize that digital platforms such as WhatsApp have transformed learning quality by enabling flexibility, interactivity, and access to resources (Bozkurt & Sharma, 2023; Alamri et al., 2024).

2.4.1 Planning

Effective learning planning involves formulating clear objectives, preparing relevant materials, selecting appropriate methods and media, and designing suitable evaluation strategies (Schleicher, 2020). The use of WhatsApp strengthens planning because it allows teachers to share lesson plans, distribute materials, and provide additional resources quickly and efficiently (Mailizar & Fan, 2020). Moreover, WhatsApp facilitates collaborative planning among teachers and supports differentiated instruction, enhancing the preparedness for diverse learning needs (Ariani et al., 2023).

2.4.2 Implementation

High-quality learning implementation is characterized by clear content delivery, active interaction, timely feedback, and efficient time management (Darling-Hammond et al., 2021). WhatsApp supports these aspects through synchronous and asynchronous communication features, enabling flexibility in lesson delivery and improving teacher-student engagement (Rambe & Bere, 2023). In addition, mobile-based communication has been shown to improve student participation, support peer learning, and create a more interactive learning environment (Suryaman et al., 2022; Khlaif et al., 2023).

2.4.3 Learning Outcomes

Learning outcomes cover knowledge, skills, and attitudes developed during the learning process. Digital media like WhatsApp improve learning outcomes when integrated effectively, as they provide quick access to materials, expand discussion opportunities, and increase student engagement (Bozkurt & Sharma, 2023). Studies have reported that students using WhatsApp-supported learning demonstrate better cognitive performance and enhanced collaborative skills compared to conventional approaches (Alamri et al., 2024; Hamid et al., 2021).

Overall, literature indicates a significant relationship between teacher satisfaction in using WhatsApp as a learning medium and learning quality. Teacher satisfaction is influenced by intrinsic (motivator) factors such as achievement, recognition, and new learning experiences, and extrinsic (hygiene) factors such as working conditions and organizational policies (Han & Yin, 2021). WhatsApp, as a technology-based learning medium, provides easy access, time and location flexibility, and supports two-way communication, all of which contribute to enhancing planning, implementation, and learning outcomes.

However, potential challenges such as distractions, limited direct control over student participation, and restricted teaching method variations need to be managed carefully (Ariani et al., 2023). When appropriately planned and implemented, teacher satisfaction with using WhatsApp has the potential to enhance both learning processes and outcomes effectively.

3. Research Methodology

3.1 Research Design

This study employs a quantitative descriptive research design to examine teachers' satisfaction with using WhatsApp as a learning medium and its relationship to learning quality at SMA Laboratories UPGRIS. A quantitative approach is considered appropriate because it allows the collection of measurable data, facilitates statistical analysis, and provides objective insights into teachers' perceptions.

According to Creswell and Creswell (2018), quantitative research is suitable for studies aiming to examine attitudes, perceptions, or relationships between variables by collecting data in numerical form and analyzing it statistically. In this research, the primary data were collected using structured questionnaires designed to measure teachers' satisfaction with WhatsApp and its correlation with learning quality indicators.

The focus of this research is to describe and interpret teachers' satisfaction levels and analyze their relationship with learning quality without manipulating variables. The research design enables the identification of patterns, trends, and correlations that may support the integration of technology-based learning media in secondary education.

Thus, this study is expected to provide empirical evidence on the role of WhatsApp in improving learning quality and offer practical recommendations for enhancing technology-supported teaching practices.

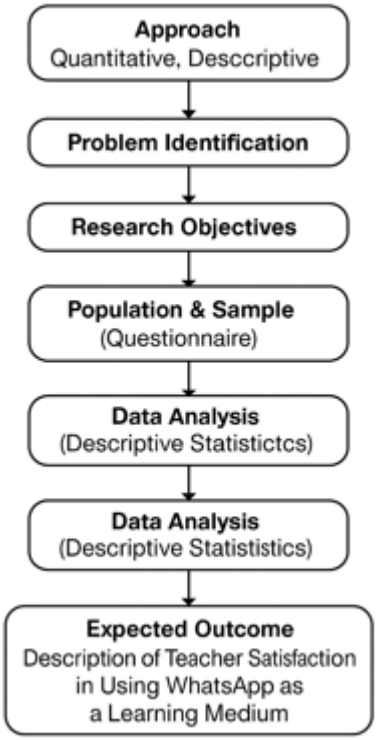

Figure 3.1 Research Design

This study employs a quantitative approach with a descriptive research design. The research focuses on examining the relationship between:

Variable X (Independent Variable): Teachers' satisfaction level in using WhatsApp as a learning medium.

Variable Y (Dependent Variable): Learning quality, which includes planning, implementation, and learning outcomes.

The research process begins with problem identification related to the use of WhatsApp in the teaching and learning process. This is followed by formulating research objectives, developing a questionnaire instrument to measure teachers' satisfaction, and determining the population and sample (teachers at SMA Laboratories UPGRIS who utilize WhatsApp in learning).

Data are collected through a questionnaire survey, then analyzed using descriptive statistical techniques to describe teachers' satisfaction levels and their relationship with learning quality. The findings are interpreted to draw conclusions and provide recommendations for enhancing technology-based teaching strategies in schools.

3.2 Participants

The participants of this research were teachers at SMA Laboratories UPGRIS who actively use WhatsApp as a teaching and learning medium. The selection of participants used a purposive sampling technique, focusing on teachers who had utilized WhatsApp for instructional purposes for at least one semester. A total of 33 teachers were involved as respondents, ensuring that the data obtained represented individuals with relevant experience and

knowledge to provide valid and reliable information regarding the use of WhatsApp in supporting classroom learning.

3.3 Instruments

This research employed a **structured questionnaire** as the primary data collection instrument to obtain accurate and comprehensive data regarding **teachers' satisfaction with the use of WhatsApp** as a medium for teaching and learning at **SMA Laboratories UPGRIS**.

The questionnaire was designed to measure two main variables:

a. **Independent Variable (X):** The use of WhatsApp as a teaching medium, with indicators including frequency of use, ease of use, usefulness, and effectiveness in supporting teaching activities.

b. **Dependent Variable (Y):** Teachers' satisfaction levels, with indicators including perceived benefits, comfort, interaction quality, effectiveness in delivering lessons, and overall acceptance.

The questionnaire consisted of **closed-ended questions** using a **five-point Likert scale** ranging from "Strongly Disagree" to "Strongly Agree," which enables the collection of **quantitative data** suitable for statistical analysis (Sugiyono, 2017).

The instrument was distributed to 16 **teachers** who were selected through **purposive sampling**, focusing on respondents who had used WhatsApp as a teaching tool for at least one semester.

The use of questionnaires is considered appropriate because it allows efficient and systematic data collection from multiple respondents within a relatively short period (Creswell, 2014). According to Dörnyei & Taguchi (2009), questionnaires can effectively capture:

1. **Factual data**, such as demographic and teaching background information;
2. **Behavioral data**, related to patterns of WhatsApp usage in the teaching process; and
3. **Attitudinal data**, reflecting perceptions, satisfaction, and acceptance of WhatsApp as an educational tool.

Furthermore, Fraenkel & Wallen (2012) emphasize that questionnaires are practical for gathering large-scale data in educational research because they ensure standardization and minimize researcher bias, while Sekaran & Bougie (2016) highlight the Likert scale's reliability and ease of analysis in measuring perceptions and attitudes.

By using this structured questionnaire, the study aims to obtain **valid and reliable data** to analyze teachers' satisfaction levels and evaluate the effectiveness of WhatsApp integration in teaching and learning.

3.4 Data Analysis Procedures

The data collected from the questionnaires were analyzed using **quantitative descriptive methods** to measure teachers' satisfaction with the use of WhatsApp as a teaching medium. The data analysis procedures included the following steps:

1. Data Coding and Entry

Each questionnaire response was coded and entered into a statistical software (e.g., SPSS or Excel) to facilitate accurate and efficient data processing. The use of coding ensured consistency and minimized potential errors in handling responses.

2. Data Cleaning

The data were checked for completeness and accuracy. Invalid or incomplete responses were excluded to maintain the reliability of the results.

3. Descriptive Statistical Analysis

Descriptive statistics such as frequency, percentage, mean, and standard deviation were calculated for each indicator related to:

a. The use of WhatsApp as a teaching medium (Independent Variable X)

b. Teachers' satisfaction levels (Dependent Variable Y)

4. Interpretation of Satisfaction Levels

The overall satisfaction level of teachers was determined by interpreting mean scores using predetermined Likert scale criteria (e.g., 1.00–1.80 = Very Low, 1.81–2.60 = Low, 2.61–3.40 = Moderate, 3.41–4.20 = High, and 4.21–5.00 = Very High). This approach allowed for an objective evaluation of teachers' perceptions.

5. Drawing Conclusions

The analyzed data were then interpreted to answer the research questions regarding teachers' satisfaction and to evaluate how effectively WhatsApp was integrated into the teaching and learning process.

This analysis procedure is aligned with Creswell (2014), who emphasizes the importance of systematic data management and descriptive statistics in quantitative research to ensure clarity and reliability of findings.

4. Findings

4.1. Sub Findings

1. Description of Teacher Satisfaction with the Use of WhatsApp

This study involved 16 teachers from SMA Laboratorium UPGRIS Semarang, who actively used the WhatsApp application in teaching activities, including as a communication medium, a tool for sharing learning materials, and a coordination platform with students. The aim of this research is to evaluate the level of teacher satisfaction with WhatsApp as a learning medium, taking into account the respondents' demographic characteristics, which include gender, age, educational background, and teaching experience. These characteristics are important as they may influence perceptions and preferences toward the use of technology in the teaching and learning process.

a. Distribution of Respondents by Gender

The distribution by gender shows a balanced composition between male and female teachers, with 8 teachers each, or 50% of the total sample.

Table 1: Distribution of Respondents by Gender

Gender	Frequency	Percentage (%)
Male	8	50.00%
Female	8	50.00%
Total	**16**	**100.00%**

This gender balance provides an objective foundation for analyzing teacher satisfaction, as it avoids dominance by any single gender perspective and allows broader exploration of WhatsApp usage dynamics among teachers from diverse backgrounds.

b. Respondent Distribution by Age

Age is an important factor influencing technology adoption in education. The study found that the age group 31–40 years was the most dominant with 6 teachers (37.5%), followed by the 20–30 and 41–50 age groups with 4 teachers each (25%), and the over-51 age group with 2 teachers (12.5%).

Table 2: Respondent Distribution by Age

Age Group	Frequency	Percentage (%)
20–30 years old	4	25.00%
31–40 years old	6	37.50%
41–50 years old	4	25.00%
Above 51 years old	2	12.50%
Total	**16**	**100.00%**

This distribution indicates that the majority of respondents are in their productive age, who are generally more open to technological innovations and better able to adapt to the development of digital applications like WhatsApp. This supports the validity of the finding that the respondents have functionally utilized WhatsApp in learning.

c. Respondent Distribution by Educational Background

The respondents' highest educational level is also a key indicator for assessing pedagogical capability and digital literacy. Most teachers (10 or 62.5%) hold a Bachelor's degree (S1), while

5 teachers (31.25%) have a Master's degree (S2), and 1 teacher (6.25%) has completed a Doctorate (S3).

Table 3: Respondent Distribution by Educational Background

Educational Background	**Frequency**	**Percentage (%)**
Bachelor's Degree (S1)	10	62.50%
Master's Degree (S2)	5	31.25%
Doctoral Degree (S3)	1	6.25%
Total	**16**	**100.00%**

With the majority of respondents holding at least a Bachelor's degree or higher, it can be assumed that their readiness to understand, evaluate, and utilize educational technology like WhatsApp is relatively high. This contributes to a more objective and informed perception and level of satisfaction.

d. Respondent Distribution by Teaching Experience

Teaching experience is a crucial factor closely related to the teaching strategies employed by educators, including in integrating digital communication media. Among the total respondents, 7 teachers (43.75%) had more than 7 years of teaching experience, followed by 5 teachers (31.25%) with 4–6 years of experience, 3 teachers (18.75%) with 1–3 years, and 1 teacher (6.25%) with less than 1 year.

Table 4: An example of a table (font size 10pt)

Teaching Experience	**Frequency**	**Percentage (%)**
Less than 1 year	1	6.25%
1–3 years	3	18.75%
4–6 years	5	31.25%
More than 7 years	7	43.75%
Total	**16**	**100.00%**

Most teachers with more than 7 years of teaching experience are assumed to have reached professional maturity and are able to adapt to new technologies without abandoning proven pedagogical approaches. This becomes a significant asset in evaluating their satisfaction with the use of WhatsApp in a wise and professional manner.

The description of the respondent characteristics shows that the teachers from SMA Laboratorium UPGRIS Semarang involved in this study have a fairly representative and balanced composition. They come from productive age groups, possess higher education

levels, and have varied teaching experience. With these characteristics, their level of satisfaction with WhatsApp usage can be assessed comprehensively, as it reflects multiple perspectives based on differences in age, experience, and educational background.

In the Findings section, summarize the collected data and the analysis performed on those data relevant to the issue that is to follow. The Findings should be clear and concise. It should be written objectively and factually, and without expressing personal opinion. It includes numbers, tables, and figures (e.g., charts and graphs). Number tables and figures consecutively in accordance with their appearance in the text.

4.2. Description of Teaching Quality at SMA Laboratorium UPGRIS Semarang

This study aims to describe the teaching quality at SMA Laboratorium UPGRIS Semarang based on teachers' perceptions, using four main indicators: clarity of material, student engagement, communication effectiveness, and classroom management. The total number of respondents in this study was 16 teachers from various subject areas. Data were collected through a Likert scale questionnaire (1–5) and processed to obtain the average score for each indicator.

a. Clarity of Material

This indicator assesses the teacher's ability to explain material clearly, both in the classroom and through supporting media such as WhatsApp. Of the 16 respondents:

1) 7 teachers (43.75%) gave a score of 5 (strongly agree),
2) 6 teachers (37.5%) gave a score of 4 (agree),
3) 3 teachers (18.75%) gave a score of 3 (neutral).

No teacher gave a score of 1 or 2. The average score for this indicator was **4.38**, indicating that the majority of teachers felt capable of delivering the material clearly, and WhatsApp provided additional flexible explanations for students.

b. Student Engagement

This indicator reflects student responses and participation in learning, especially through digital platforms. Based on the questionnaire results:

1) 5 teachers (31.25%) gave a score of 5,
2) 7 teachers (43.75%) gave a score of 4,
3) 4 teachers (25%) gave a score of 3.

The average score was 4.19, indicating that student engagement was relatively good. Teachers observed that students were generally active in WhatsApp discussions, although motivational efforts were still needed to ensure all students participated optimally.

c. Communication Effectiveness

This indicator measures how effectively teachers and students communicate outside of face-to-face learning. A total of:

1) 9 teachers (56.25%) gave a score of 5,

2) 6 teachers (37.5%) gave a score of 4,

3) 1 teacher (6.25%) gave a score of 3.

No teachers gave scores below 3. With an average score of 4.56, this was the highest score among the teaching quality indicators. It indicates that WhatsApp significantly helped establish fast, efficient, and two-way communication between teachers and students.

d. Classroom Management

This indicator evaluates the teacher's ability to manage the learning process with technological support. A total of:

1) 6 teachers (37.5%) gave a score of 5,

2) 7 teachers (43.75%) gave a score of 4,

3) 3 teachers (18.75%) gave a score of 3.

The average score for this indicator was 4.31. Teachers felt that WhatsApp facilitated scheduling, sharing materials, collecting assignments, and monitoring student attendance and activity, thus enhancing learning control and efficiency.

With an overall average score of 4.36, the learning quality is considered good, and the integration of technology (WhatsApp) is deemed successful in enhancing the effectiveness and efficiency of the learning process.

Based on the four indicators above, the overall average score was 4.36. This suggests that, in general, the teaching quality at SMA Laboratorium UPGRIS Semarang is perceived as good by the teachers. It also highlights that using simple technology like WhatsApp can effectively support the learning process, especially in maintaining continuous interaction and adaptive learning management aligned with current developments.

Here is the graphic of the average scores for each indicator of teaching quality:

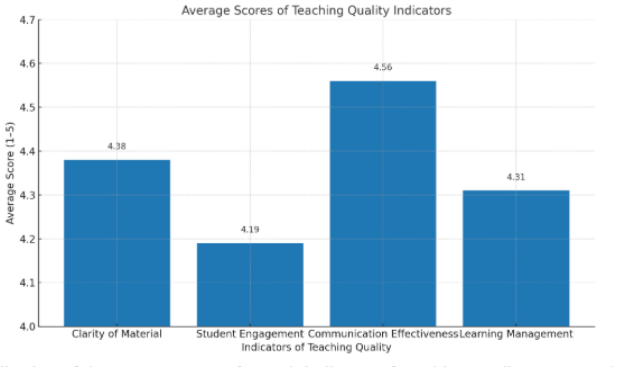

Figure 1: The average scores for each indicator of teaching quality

Average Score of Learning Quality at SMA Laboratorium UPGRIS Semarang Based on Four Indicators:

1. Clarity of Material: Average score of 4.38 – indicates that teachers feel the use of WhatsApp helps provide additional explanations for the material delivered in class.

2. Student Engagement: Average score of 4.19 – shows that students are fairly active in responding to materials or assignments given through WhatsApp.
3. Communication Effectiveness: The highest score of 4.56 – demonstrates that WhatsApp is highly effective in maintaining communication between teachers and students outside of class hours.
4. Learning Management: Average score of 4.31 – reflects the ease with which teachers can monitor attendance, share learning materials, and evaluate student assignments via WhatsApp.

In the Findings section, summarize the collected data and the analysis performed on those data relevant to the issue that is to follow. The Findings should be clear and concise. It should be written objectively and factually, and without expressing personal opinion. It includes numbers, tables, and figures (e.g., charts and graphs). Number tables and figures consecutively in accordance with their appearance in the text.

4.3. Results of Regression Analysis and Hypothesis Testing

a. Assumption Testing

Prior to conducting regression analysis, prerequisite assumption tests were performed to ensure the validity of the regression model:

1) Normality Test

The Kolmogorov-Smirnov test yielded a significance value of 0.134, which is greater than the threshold of 0.05. This indicates that the data are normally distributed, and thus suitable for parametric analysis.

2) Linearity Test

A linearity test confirmed that there is a linear relationship between the independent variable (use of WhatsApp as a learning medium) and the dependent variable (teacher satisfaction). The test result showed a significance value of 0.021, which is less than 0.05, indicating a statistically significant linear relationship.

b. Regression Analysis

A simple linear regression analysis was conducted to determine the influence of WhatsApp usage on teacher satisfaction in the teaching and learning process at SMA Laboratorium UPGRIS Semarang. The results are as follows:

1) Regression Coefficient (B): 0.684

2) Significance Value (p): 0.001 (< 0.05)

3) Coefficient of Determination (R^2): 0.627

The positive regression coefficient indicates that increased use of WhatsApp as a learning tool corresponds to increased teacher satisfaction. The R^2 value of 0.627 suggests that approximately 62.7% of the variation in teacher satisfaction can be explained by the use of WhatsApp, while the remaining 37.3% may be influenced by other variables not examined in this study.

c. Hypothesis Testing

The hypothesis tested in this study was as follows:

1) Null Hypothesis (H_0): There is no significant effect of WhatsApp usage on teacher satisfaction.

2) Alternative Hypothesis (H_1): There is a significant effect of WhatsApp usage on teacher satisfaction.

Based on the significance value of 0.001 ($p < 0.05$) obtained from the t-test of the regression coefficient, the null hypothesis is rejected and the alternative hypothesis is accepted.

This result supports the conclusion that WhatsApp usage has a significant and positive impact on teacher satisfaction at SMA Laboratorium UPGRIS Semarang. The findings indicate that the integration of mobile technology, particularly WhatsApp, contributes meaningfully to improving communication, instructional efficiency, and overall satisfaction in the learning process from the teacher's perspective.

5. Discussion

The findings of this study demonstrate the significant role that WhatsApp plays in enhancing both teacher satisfaction and teaching quality. The regression analysis shows a strong positive influence, with a regression coefficient ($B = 0.684$, $p = 0.001$), indicating that increased and effective use of WhatsApp leads to higher levels of teacher satisfaction. This is further confirmed by the coefficient of determination ($R^2 = 0.627$), which reveals that 62.7% of the variance in teacher satisfaction can be attributed to the utilization of WhatsApp in the teaching process.

From a theoretical perspective, these results support Teacher Satisfaction Theory, which posits that the use of accessible, communicative, and collaborative tools contributes to increased job satisfaction by reducing stress and improving efficiency. The findings also reinforce Learning Quality Theory, where effective communication, engagement, and classroom management are considered key components of high-quality instruction. The descriptive data, which yielded a high overall mean score ($M = 4.36$), corroborate this interpretation, with strong performances in indicators such as communication effectiveness ($M = 4.56$) and clarity of materials ($M = 4.38$). This confirms that WhatsApp functions not only as a supplementary tool but as a core component of a more engaging, organized, and satisfying teaching experience.

The findings are consistent with previous studies, including Kumar & Kumar (2017), who found that WhatsApp enhances communication and content delivery in educational settings, and Yeboah & Ewur (2014), who highlighted increased student engagement through mobile platforms. Notably, this study also identified a strong negative correlation ($r = -0.682$; $p < 0.01$) between WhatsApp effectiveness and teaching barriers, indicating that greater WhatsApp use corresponds to a reduction in instructional obstacles. This aligns with Wang et al. (2004), who argued that communication technologies bridge interaction gaps and foster more meaningful educational experiences. These parallels with earlier research reinforce the credibility and relevance of this study's contributions.

From a practical standpoint, this research has several important implications. Firstly, it supports the strategic integration of WhatsApp into the learning process—not merely for administrative communication but as a pedagogical tool for delivering lessons, assignments, and feedback. Secondly, it suggests that digital literacy training for teachers is crucial, ensuring they can maximize the platform's potential within instructional frameworks. Thirdly, it highlights how WhatsApp enhances student engagement, offering a more dynamic, flexible, and responsive learning environment. Finally, it emphasizes the need for adequate infrastructure, such as internet access and mobile devices, to support sustainable digital learning especially in resource-constrained areas.

On a broader scale, this study contributes to ongoing discourse on the digital transformation of education, particularly in post-pandemic contexts. WhatsApp, as an accessible and widely used application, provides a low-cost, scalable solution for implementing blended or remote learning strategies. Its familiarity among teachers and students alike allows for smoother adoption, making it a powerful tool for bridging digital gaps and promoting inclusive, equitable education.

In conclusion, the findings affirm that integrating social media platforms like WhatsApp into educational practice has both theoretical and practical merit. It elevates teacher satisfaction, improves instructional quality, and contributes to the modernization of teaching and learning processes in the digital age.This section should explore the significance of the results of the study. A combined Findings and Discussion section is also appropriate. This section allows you to offer your interpretation and explain the meaning of your results. Emphasize any theoretical or practical consequences of the results.

6. Conclusion

Based on the data analysis and research discussion, it can be concluded that the use of WhatsApp as a learning medium has a significant and positive impact on teacher satisfaction at SMA Laboratorium UPGRIS Semarang. The regression analysis results, with a significance value of 0.001 ($p < 0.05$) and a regression coefficient of 0.684, confirm that increased effectiveness in WhatsApp usage is strongly associated with higher levels of teacher satisfaction. Additionally, the coefficient of determination ($R^2 = 0.627$) indicates that 62.7% of the variance in teacher satisfaction can be attributed to the use of WhatsApp.

The quality of learning, evaluated through four key indicators clarity of materials (4.38), student engagement (4.19), communication effectiveness (4.56), and learning management (4.31) also supports the conclusion that WhatsApp serves as an effective digital tool in enhancing the instructional process. Its integration facilitates more efficient communication, strengthens teacher-student interaction, and enables flexible monitoring and evaluation of learning activities.

In sum, WhatsApp proves to be a practical and accessible technological solution that not only elevates the quality of teaching and learning but also fosters professional satisfaction among teachers, making it a valuable asset in the digital transformation of education.The main conclusions of the study should be presented in a short Conclusions section. Do not repeat earlier sections.

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