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INNOVATION IN ACADEMIC SUPERVISION: A STUDY OF DIGITAL-INTERPERSONAL COMMUNICATION MODELS IN SENIOR HIGH SCHOOLS IN BANTAENG REGENCY

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Abstract

This study aims to identify and analyse the implementation of the digital-interpersonal academic supervision model in SMAN 1–6 Bantaeng Regency as well as the challenges and successes encountered in combining digital and face-to-face communication in academic supervision. This study uses a qualitative approach with a case study type, collecting data through in-depth interviews, participatory observation, and Focus Group Discussions (FGD) with the principals, vice principals for curriculum, and teachers at the six schools involved. The findings show that although digital technologies such as WhatsApp Groups and Ruang GTK are very helpful in the administration and monitoring of supervision progress, face-to-face communication still plays an important role in providing more personalised motivation and feedback. In addition, challenges that arise include limitations in digital infrastructure, digital skill gaps among teachers, and the need to maintain a balance between digital and face-to-face communication. This study concludes that the ideal digital-interpersonal supervision model is a blended supervision model with a 50% digital and 50% face-to-face composition, which can optimise administrative efficiency without sacrificing the personal relationships that are important in the teacher development process.

Keywords: Academic Supervision, Communication Model, Digital Communication, Senior High School

I. INTRODUCTION

The paradigm shift in education in the digital era demands innovation in the academic supervision system to be more adaptive to technological developments and interpersonal communication needs in schools[1], [2], [3] . Academic supervision is no longer merely an administrative activity, but rather a professional development process that emphasises dialogue, reflection, and collaboration between school principals and teachers. In various educational units, especially secondary schools, academic supervision faces new challenges due to digitalisation [4], [5], such as low technological literacy among senior teachers, unequal internet access, and a decline in emotional closeness due to virtual communication. This phenomenon is evident at Bantaeng Regency State High School, where the academic supervision process has begun to integrate digital media such as WhatsApp Groups, Ruang GTK, Google Meet, and Zoom, but its effectiveness is often influenced by interpersonal factors, such as empathy, motivation, and warm face-to-face communication. School principals and teachers realise that a fully digital approach can eliminate the humanistic aspects of coaching, while a fully face-to-face approach is considered inefficient. Therefore, there is a need for an academic supervision model that combines the strengths of digital and interpersonal communication in a balanced, effective, and adaptive manner.

The digital divide and variations in communication culture among teachers show that the effectiveness of supervision does not only depend on the availability of technology [6], [7], but also on how messages, feedback, and emotional support are conveyed. In the context of Bantaeng District, observation and interview results indicate that the Digital-Interpersonal communication model is a promising approach to bridge the need for digital efficiency with interpersonal empathy. Supervision that is too formal and based on digital documents tends to diminish the meaning of coaching, while interpersonal communication that is not digitally documented has the potential to reduce accountability. These conditions form the basis for the development of an effective and adaptive digital-interpersonal communication model, which not only maintains the essence of professional coaching but also ensures continuous digital documentation, monitoring, and reflection. This phenomenon is relevant to national efforts in the digital transformation of education as mandated by the Ministry of Education, Culture, Research, and Technology [8], [9] , which encourages the digitisation of school management without neglecting human values in educational interactions.

Previous studies have confirmed that the success of academic supervision is largely determined by the quality of communication between the head teacher and teachers. Study [10] found that effective communication during academic supervision requires interpersonal skills such as empathy, appreciation, clarity of instructions, and a wise attitude from the supervisor. Meanwhile, Zalli & Pahlawan[11] quantitatively proved that headteacher communication has a positive and significant correlation with teacher performance, contributing up to 85%, and that academic supervision improves performance by up to 89%. These findings confirm that communication is not merely a channel of information, but also an instrument of professional development that has a direct impact on the quality of learning. However, most of these studies still focus on the context of conventional face-to-face communication, without examining the integration of digital communication, which is now a real necessity in modern supervision practices.

Furthermore, research by [12] shows that the implementation of academic supervision in secondary schools still tends to be administrative and is not yet optimal in guiding teachers reflectively, especially in utilising information technology. These results are in line with the findings of [13] , which confirm that ICT-based academic supervision can improve teachers' ability to carry out learning when accompanied by personal coaching and peer training. The study [14] also highlights the importance of communication principles in scientific, democratic, constructive, and empathetic educational supervision, utilising communication models such as Shannon & Weaver and Berlo's SMCR Model. However, in the context of a digital globalisation, there is still limited research that combines the power of digital communication with interpersonal empathy values in an academic supervision model that is adaptive to social conditions and school infrastructure. Therefore, this study attempts to fill this gap by designing an effective and adaptive Digital-Interpersonal communication model to improve the quality of academic supervision in Bantaeng Regency Senior High Schools.

Although there are various studies discussing the importance of communication in academic supervision, most previous studies are still limited to face-to-face communication or the use of technology that is not yet fully optimal. Most studies do not explicitly examine how digital communication can be integrated in a balanced manner into the academic supervision process. In this context, although technology has been used in many aspects of education, the use of digital technology in academic supervision is often limited to administrative management and material delivery, without considering personal interactions that build trust and motivation between teachers and supervisors. Thus, there is an urgent need to investigate a supervision communication model that combines digital and interpersonal elements more holistically. The novelty offered by this study lies in the development and application of a Digital-Interpersonal communication model that integrates digital technology with a humanistic approach in academic supervision at senior high schools in Bantaeng Regency. Unlike previous studies that mostly assessed digital and face-to-face communication separately, this study attempts to create a balance between the two to achieve more effective and adaptive supervision goals. In addition, the proposed model also accommodates differences in teacher characteristics, including gaps in digital literacy between young and senior teachers, as well as differences in infrastructure between schools.

This study aims to identify how a combination of digital and interpersonal communication can improve the quality of academic supervision and encourage the development of teacher professionalism in the digital age. The argument underlying this study is that in a hyper-connected digital age, technology-based communication must be combined with an interpersonal approach that allows for more personal and empathetic guidance. By combining the strengths of these two elements, it is hoped that academic supervision can be carried out more efficiently, accountably, and with a focus on improving the quality of learning involving all stakeholders in the school, including the head teacher, teachers, and students. In addition, this study is also expected to contribute to the development of education policies that support the implementation of technology-based academic supervision, which is more flexible and inclusive of diverse field conditions.

II. LITERATUR REVIEW

Academic supervision plays an important role in improving the quality of education, whether at the primary, secondary, or tertiary level. The study "[15] highlights that effective academic supervision in Bangladesh is key to improving the quality of primary education. This study reveals that the lack of systematic and professional supervision can hinder the quality of teaching and lead to low teacher motivation. In this context, the role of academic supervisors who have good communication skills and are able to provide emotional support is very important in creating a productive learning environment. This is in line with the findings of [16] , which states that well-conducted academic supervision not only improves teacher competence but also creates a more efficient learning atmosphere and supports the achievement of holistic educational goals. Academic supervision is not limited to monitoring teachers' work, but also to empowering them to develop their personal and professional capacities, which ultimately has a direct impact on the quality of learning in the classroom.

Furthermore, Karnati's research [17] shows that the implementation of academic supervision by school principals plays a major role in improving teacher competence. However, even though it has been implemented well in many schools, there are still several obstacles to optimising the implementation of supervision, such as teachers' less than positive perceptions of the existing supervision implementation, as well as shortcomings

in the preparation and implementation of academic supervision programmes. This shows that ideal academic supervision must be tailored to the needs of teachers and the school context, and supported by clear and structured policies.

Effective communication is one of the key components of successful academic supervision. The study [18] reveals that interpersonal communication between school principals and teachers has a significant impact on improving teacher performance. Good communication can help teachers overcome challenges in their work and motivate them to continue improving the quality of learning. However, even though interpersonal communication is already functioning well in many schools, there are still weaknesses in optimising this communication in order to support teachers' overall performance. The results of this study show that more open and empathetic communication between school principals and teachers can help reduce stress and increase teachers' morale, which ultimately has a positive impact on the quality of teaching.

The study reinforces these findings by showing that smooth interpersonal communication in academic supervision can significantly improve teacher performance. The study also found that in addition to communication between school principals and teachers, communication among fellow teachers also plays a role in supporting their professional development. Meanwhile, study [10] emphasise the importance of communication skills such as listening with empathy, giving clear instructions, and maintaining respectful relationships. They revealed that effective communication in academic supervision does not only focus on conveying information, but also on fostering deep and respectful relationships between supervisors and those being supervised. Therefore, communication in academic supervision must prioritise relational aspects, not just administrative ones.

Technological developments have had a significant impact on the implementation of academic supervision, introducing new methods that are more efficient and flexible. Research [19] reveal that virtual academic supervision has been proven to increase time efficiency and expand the reach of mentoring programmes. They found that technology-based supervision models, especially those combining video conferencing and learning management platforms, increase the satisfaction of teachers and school principals. This study highlights that technology-based academic supervision not only provides efficiency in administrative processes but also enriches the learning experience through more flexible synchronous and asynchronous interactions.

Research supports these findings by suggesting the use of online applications, such as Edmodo, as effective supervision tools. The Edmodo-based MARIA (Mapping, Arranging, Running, Identifying, Acting) supervision model has been proven to improve teacher and principal performance and reduce the stress often felt by teachers in the supervision process. This study shows that the use of technology in academic supervision can facilitate the monitoring process and improve the quality of learning in a more efficient manner. However, the challenge faced is the gap in access to technology, especially in areas with limited infrastructure. 's research , which tested the effectiveness of the Teacher Academic Supervision Information System (SI SAGU) in 3T areas, also shows that despite geographical constraints, the use of the right information system can improve the effectiveness of supervision, provided it is supported by the active participation of all stakeholders. This shows that technology can bridge physical barriers and optimise the implementation of academic supervision in remote areas.

III. RESEARCH METHODOLOGY

3.1 Type and Design of Research
This study uses a qualitative approach with a case study type to understand the implementation of Digital-Interpersonal communication in academic supervision at Bantaeng Regency Senior High School. A qualitative approach was chosen because this study aims to explore the experiences, views, and in-depth perspectives of relevant parties regarding the dynamics of communication in the academic supervision process. Case studies were chosen to provide an in-depth understanding of how this supervision model is applied in the context of schools with diverse characteristics and challenges, particularly those related to digital infrastructure and the communication skills of teachers and principals.

3.2 Unit of Analysis
The unit of analysis in this study was the academic supervision process carried out in six senior high schools in Bantaeng Regency, involving principals, vice principals, and teachers. The focus of the analysis is on the interactions that occur during the supervision process, both those using digital tools (such as WhatsApp Groups, GTK Rooms, and other platforms) and face-to-face communication. Thus, the unit of analysis includes the main actors in academic supervision and how they interact in the context of academic guidance and evaluation.

3.3 Data Sources and Collection Techniques
Data collection techniques were carried out using participatory observation, in-depth interviews, and Focus Group Discussions (FGDs). Participatory observation was conducted by directly participating in the supervision activities that took place in these schools to gain more authentic insights into the interactions that occurred during the supervision process. In-depth interviews were conducted with school principals, vice principals, and a number of teachers to explore their perceptions of the academic supervision model implemented and the challenges faced, both in digital and interpersonal aspects. FGDs were also held with

school officials to collectively discuss various issues related to the effectiveness of academic supervision and communication, as well as to explore potential improvements to the existing model.

Table 1. Data List of Key Research Informants

Informant	School	Position
Informant I	State Senior High School 1	Headmaster
Informant II	State Senior High School 1	Teacher
Informant III	State Senior High School 2	Headmaster
Informant IV	State Senior High School 2	Deputy Head of Curriculum
Informant V	State Senior High School 2	Teacher
Informant VI	State Senior High School 3	Headmaster
Informant VII	State Senior High School 3	Deputy Head of Curriculum
Informant VIII	State Senior High School 3	Teacher
Informant IX	State Senior High School 4	Headmaster
Informant X	State Senior High School 4	Deputy Head of Curriculum
Informant XI	State Senior High School 4	Teacher
Informant XII	State Senior High School 5	Headmaster
Informant XIII	State Senior High School 5	Deputy Head of Curriculum
Informant XIV	State Senior High School 5	Teacher
Informant XV	State Senior High School 6	Headmaster
Informant XVI	State Senior High School 6	Deputy Head of Curriculum
Informant XVII	State Senior High School 6	Teacher

Source: Results of Researcher Data Processing, 2025

Table 1 above shows a list of informants involved in this study. The informants involved consisted of three main categories, namely the Principal, Deputy Head of Curriculum, and Teacher, each from six senior high schools (SMAN 1–6) in Bantaeng Regency. Each school provides various perspectives, including the principal's experience in managing academic supervision, the deputy principal for curriculum who is responsible for curriculum development and implementation, and teachers who are directly involved in the supervision process. This table reflects the variation in the roles and experiences of each informant, which allows the study to explore comprehensive views from various stakeholders in the school. The categories of headmaster and deputy headmaster for curriculum show managerial and policy perspectives in academic supervision, while the teacher category describes the practical views of individuals directly involved in the implementation of supervision in the field.

In this study, informants were selected using purposive sampling, which is a sampling method conducted deliberately based on certain criteria deemed relevant to the research objectives. This technique was chosen because it allowed researchers to select informants who had direct knowledge and experience related to the topic under study, namely the implementation of the Digital-Interpersonal academic supervision model at senior high schools in Bantaeng Regency. The selection of informants focused on three main categories that have key roles in the academic supervision process, namely the principal, the vice principal (curriculum), and teachers. Each category of informants was selected to explore various perspectives involving policy-making, management, supervision implementation, and practical experiences in carrying out academic supervision in the field.

In selecting informants, the researcher also considered the diversity of experiences and digital infrastructure conditions in each school. For example, schools that rely more on digital technology (such as SMAN 1 and SMAN 2) were selected to provide insights into the implementation of technology-based supervision. On the other hand, schools with limited digital infrastructure (such as SMAN 3 and SMAN 4) provided insights into the challenges faced in implementing digital-based supervision and how they overcame the technological gap in this context. The selection of informants using purposive sampling ensures that the data obtained is relevant and representative of the diverse experiences faced by those directly involved in academic supervision at senior high schools in Bantaeng Regency. This approach also allows researchers to explore more in-depth information about the successes, challenges, and solutions adopted in the implementation of the Digital-Interpersonal supervision model in various schools with different characteristics. Thus, this purposive sampling technique contributes to producing rich and in-depth data, which in turn enriches the analysis and findings of the research.

3.4 Data Analysis Procedures

The data analysis technique used is thematic coding analysis, applying open coding, axial coding, and selective coding techniques based on the grounded theory approach. In the open coding stage, data obtained from interviews, observations, and FGDs will be analysed to identify initial categories that emerge related to digital and interpersonal communication in academic supervision. Next, axial coding is used to connect these categories and form a more structured understanding of the relationship between the elements of communication in the applied supervision model. In the selective coding stage, the researcher will integrate the categories that have been formed to formulate a theory that describes how digital and interpersonal communication play a role in improving the effectiveness of academic supervision. This grounded theory approach allows researchers to develop models based on empirical data obtained from the field, so that the resulting theory can reflect the real conditions in the schools studied.

This method was chosen to provide an in-depth and contextual analysis of academic supervision practices in Bantaeng Regency, as well as to produce a practical and adaptive model that can be implemented in schools with similar conditions. Thus, this study not only provides theoretical insights into communication in academic supervision but also makes a practical contribution to improving the quality of academic supervision in areas with limited digital infrastructure.

Table 2. Examples of Stages of Data Analysis Techniques with Open Coding, Axial Coding, and Selective Coding

Stages of Analysis	Descriptive Explanation	Research Informants
Open Coding	Interviews and observational data were transcribed and divided into small meaningful units. Each statement was coded to identify important issues without linking them to specific categories.	All informants focused on: the use of digital technology in supervision, challenges in digital communication, interpersonal experiences in supervision, and the importance of direct feedback.
Axial Coding	Initial codes were grouped into more conceptual categories. At this stage, researchers linked categories, identified thematic patterns, and placed them in the context of academic supervision with a digital-interpersonal model.	All informants focused on: the role of digital technology in improving the efficiency of supervision, the challenges of the digital divide, face-to-face communication as an element of coaching, and teachers' motivation in accepting supervision.
Selective Coding	Researchers filter categories into core themes most relevant to the research questions. These core themes are then linked to theoretical frameworks such as Interpersonal Communication Theory and Innovation Diffusion Theory.	All informants contributed narratives about: the digital-interpersonal-based academic supervision model, the balance between digital and face-to-face communication, and the role of the headteacher in motivating teachers.

Source: Results of Researcher Data Processing, 2025

This table illustrates the stages of data analysis used in this study, which adopts the Grounded Theory method with three main stages of analysis: Open Coding, Axial Coding, and Selective Coding. In the Open Coding stage, data obtained from interviews and observations are transcribed and broken down into small meaningful units. Each statement or segment of data is coded to identify important issues without linking them to specific categories at the outset. The purpose of this stage is to identify the main themes that emerge from the data openly. In this study, all informants contributed to identifying issues related to the use of digital technology in supervision, the challenges of digital communication, and the importance of face-to-face communication in coaching, which were then developed into relevant initial codes.

In the Axial Coding stage, the categories found during Open Coding were grouped into more conceptual and interconnected categories. Here, the researchers began to link these categories to identify larger thematic patterns and the relevance of these categories to the context of implementing the digital-interpersonal academic supervision model. Informants provided deeper insights into the role of digital technology in improving the efficiency of supervision, the challenges arising from the digital divide, and how face-to-face communication plays a role in motivating teachers and providing more personalised coaching. Researchers linked these categories to existing supervision practices, highlighting the importance of balancing both forms of communication in different contexts in each school.

Finally, in the Selective Coding stage, the researcher filtered the relevant categories and compiled them into core themes most relevant to the research questions. At this stage, the categories found earlier were filtered and further categorised into main themes that led to a more comprehensive understanding of the phenomenon under study. The researchers linked these core themes to theoretical frameworks, such as Interpersonal Communication Theory and Innovation Diffusion Theory, to explain how a supervision model that combines digital and interpersonal elements can improve the effectiveness of academic supervision. From this stage, all informants contributed to the narrative regarding the implementation of the digital-interpersonal academic supervision model, focusing on the balance between technology and face-to-face interaction, as well as how the principal plays an important role in motivating and supporting teachers through adaptive and flexible communication. Thus, these stages of analysis form a more comprehensive and in-depth framework regarding the application of the academic supervision model at Bantaeng Regency High School.

IV. FINDINGS RESEARCH

4. 1 The Use of Digital Technology in Academic Supervision

The interview results show that the use of digital technology in academic supervision at SMAN 1 to SMAN 6 varies greatly. Most schools, such as SMAN 1 and SMAN 2, have integrated digital platforms such as WhatsApp Group and Ruang GTK for managing supervision schedules, but it should be noted that without face-to-face interaction, many teachers feel that they are not receiving enough personal attention. Although technology provides efficiency in monitoring and documentation, several informants, especially teachers at SMAN 3 and SMAN 4, mentioned that digital feedback feels impersonal and focuses only on administration, not on learning development. This indicates that digital technology provides convenience in supervision management but still requires interpersonal interaction to ensure more comprehensive and meaningful coaching quality. Therefore, there needs to be a balance between digital and face-to-face use to ensure that the personal aspect of supervision is maintained.

Table 3. Results of Grounded Theory Analysis of the Use of Digital Technology in Academic Supervision

Informant	Statements	Open Coding	Axial Coding	Selective Coding
Principal of SMAN 1	"We have been using WhatsApp Groups and the GTK Room to communicate supervision schedules, but without face-to-face interaction, teachers feel less personally cared for."	Use of WhatsApp Group, GTK Room, Lack of personal interaction	Digital utilisation in supervision, interpersonal communication gap	The importance of balancing digital and face-to-face methods for effective supervision
Teachers at SMAN 1	"If the headteacher directly tells me what needs to be improved, I become more motivated to do it."	Direct feedback, Teacher motivation	The influence of direct communication on motivation, The importance of personal feedback	Direct communication boosts teachers' morale
Principal of SMAN 2	"We combine the two, so those who are not digitally savvy are still assisted	Combination of digital and	Integration of digital and manual sys-	Flexible solutions in academic supervision using a combined approach

	manually, and then we upload the information."	manual methods, Digital limitations	tems, Addressing infrastructure limitations	
Deputy Head of Curriculum at SMAN 2	"If it's only digital, teachers often see it as just a formality. But when we invite discussion, that's when the mentoring becomes evident."	Digital formality, The importance of discussion	Challenges in digital communication, Strengthening through face-to-face discussions	Balancing digital and face-to-face communication strengthens teacher guidance
Teachers at SMAN 2	"I often learn from files shared by friends in the WhatsApp group."	Collective learning, Sharing digital materials	Digital learning, Collaboration among teachers	Technology supports collaboration, but direct interaction is still necessary
Deputy Head of Curriculum at SMAN 3	"Young teachers adapt quickly, but many senior teachers still struggle with uploading documents."	Senior teachers' difficulties, Technology adaptation	Digital divide among teachers, need for training	Challenges of the digital divide, the need for training for senior teachers
Principal of SMAN 3	"We document observation results with photos, then store them in a digital folder even though the internet is often slow."	Digital documentation, Internet limitations	Data storage, Infrastructure limitations	Use of technology with infrastructure limitations, the importance of documentation
Teacher at SMAN 3	"If the supervision schedule and instrument format have been sent in the WhatsApp group, that is very helpful. So during face-to-face meetings, we can focus on the content, not the administration."	Use of WhatsApp, Focus on substance	Efficiency through digitalisation, Reduction of administrative burden	Technology speeds up administration, optimising time for mentoring
Principal of SMAN 4	"The internet often disconnects, so we rely more on in-person meetings. But we still document the results with photos and reports uploaded to GTK."	Limited internet access, reliance on face-to-face interactions	Digital limitations, the importance of face-to-face interaction	Reliance on face-to-face meetings, but digital documentation remains for monitoring purposes
Deputy Headteacher of SMAN 4	"We often conduct personal coaching sessions after classroom observations. Teachers feel more motivated because they feel connected."	Personal coaching, Teacher motivation	Personal development, The influence of close relationships	Strengthening motivation through personal coaching and close relationships with the head teacher
Teachers at SMAN 4	"If it's just uploading, it feels like an assessment, not coaching."	Uploading results, Feeling of being assessed	Feelings of not being valued, Need for real coaching	Effective coaching requires direct interaction to avoid the impression of assessment
Deputy Head of Curriculum at SMAN 5	"We strive for balance, 50% digital, 50% face-to-face. Teachers find it easier to receive feedback if there are already digital documents, which are then discussed in reflective forums."	Balance between digital and face-to-face, Reflective discussion	Blended supervision, Effectiveness of feedback	A balanced supervision model between digital and face-to-face for more effective coaching
Teachers at SMAN 5	"If there's a WhatsApp notification, it feels more obligatory to do it because everyone can see it."	WhatsApp notifications, Task obligations	The influence of digital technology on teacher engagement	Technology increases teachers' sense of responsibility through task visibility
Principal of SMAN 5	"If everything is digital, teachers get tired quickly. If everything is face-to-	Digital fatigue, face-to-face time wastage	Balance between digital	Optimal solution with the Digital-Interpersonal model

	face, too much time is wasted. So it has to be Digital-Interpersonal."		and face-to-face	for effective supervision
Teacher at SMAN 6	"Digital feedback feels impersonal, but when it's face-to-face, I feel more valued and heard."	Digital feedback, the need for empathy	Differences between digital and face-to-face feedback, the influence of empathy	Face-to-face communication is more effective in building empathy and providing clarification
Teacher at SMAN 6	"I often misunderstand things when I only read comments on the app. After meeting face-to-face, it became clear what the headteacher meant."	Misunderstandings in digital feedback, Face-to-face clarification	Challenges of digital communication, Need for clarity	Using face-to-face communication to clarify feedback and avoid misunderstandings
Deputy Headteacher of SMAN 6	"Digital is just a tool, not a replacement for human relationships."	Digital as a tool, not a substitute for relationships	Human development, personal relationships in supervision	Emphasising the importance of human relationships in supervision, even though technology helps

Source: Results of Researcher Data Processing, 2025

This table presents the results of interviews with informants from various positions at SMAN 1–6 Bantaeng Regency, including the Principal, Deputy Principal for Curriculum, and Teachers. Each statement from the informants was identified using Open Coding, which broke down the statements into meaningful units such as technology use, interpersonal communication, and teacher motivation. The Axial Coding stage then grouped these codes into larger categories, such as digital technology implementation, infrastructure limitations, and the role of face-to-face interaction in building relationships. Furthermore, in the Selective Coding stage, these categories were filtered and linked to a broader theoretical framework to develop an effective digital-interpersonal academic supervision model. The main findings from this table show that although digital technology provides efficiency and convenience in documentation and monitoring, face-to-face communication still plays a very important role in providing motivation and personal guidance for teachers. Moreover, gaps in digital infrastructure and difficulties in adaptation among senior teachers are major challenges in the implementation of a fully digital supervision model. Therefore, a blended supervision approach, which combines 50% digital and 50% face-to-face, is considered the ideal solution to overcome these problems and ensure maximum academic supervision effectiveness.

Based on interviews conducted with the principal, vice principal of curriculum, and teachers at SMAN 1–6 in Bantaeng Regency, this study found several important findings related to the implementation of the digital-interpersonal academic supervision model. The first finding reveals that the use of digital technologies such as WhatsApp Groups and Ruang GTK has helped in communicating supervision schedules and monitoring teacher progress, especially in schools such as SMAN 1 and SMAN 2. However, although this technology provides efficiency in administrative management, principals and teachers acknowledge that without face-to-face interaction, teachers feel they are not receiving enough personal attention. This shows that although digital technology can improve efficiency, face-to-face communication is still necessary to build stronger interpersonal relationships and motivate teachers. In addition, this study also identified the challenge of digital infrastructure limitations faced by several schools, such as SMAN 3 and SMAN 4, which often experience problems such as internet disruptions and difficulties in digital adaptation by senior teachers. Although digital technology is used to document observation results and coordination, the digital skills gap is a major obstacle in the implementation of technology-based supervision. Senior teachers in several schools expressed difficulties in uploading documents and using digital platforms smoothly. These findings indicate that the implementation of a digital-interpersonal supervision model needs to take into account the infrastructure and digital capabilities of teachers, as well as offer training and technical support to improve teachers' digital skills.

Even more interestingly, the findings also emphasise the importance of face-to-face communication in strengthening emotional bonds and providing more in-depth feedback. At schools such as SMAN 4 and SMAN 6, the headteachers and deputy headteachers mentioned that personal coaching after classroom observations and face-to-face discussions were more effective in improving teacher motivation than communication that relied solely on digital platforms. Teachers also feel that digital feedback often feels cold and unclear, while face-to-face communication allows principals to provide clearer explanations and show empathy, which in turn improves their performance and motivation. These findings lead to the conclusion that the ideal academic supervision model is a blended supervision model, which combines the use of digital technology for administrative and document efficiency with face-to-face communication for strengthening personal coaching. The headmaster at SMAN 5 emphasised that a 50% digital and 50% face-to-face ratio is

the ideal combination for creating effective and comprehensive supervision, given the advantages of technology and the importance of personal relationships in supervision. This model can maximise both aspects, namely digital convenience and interpersonal closeness, which ultimately improves teacher performance and the quality of education in these schools.

4.2 Challenges in Implementing the Digital-Interpersonal Academic Supervision Model in Senior High Schools in Bantaeng Regency

The challenges in implementing the digital-interpersonal supervision model are clearly evident from the findings at SMAN 3 and SMAN 4, which face limitations in digital infrastructure, such as internet disruptions that render digital communication ineffective. Several principals and vice principals of curriculum at these schools stated that they rely more on face-to-face interaction to establish emotional connections with teachers. On the other hand, senior teachers at SMAN 3 also expressed difficulties in uploading digital documents, indicating a digital skills gap among teachers. These obstacles show that the implementation of the digital-interpersonal model must consider technological limitations and varying digital competencies among teachers, making the flexibility of the supervision model very important to achieve maximum coaching goals.

Table 4. Results of Grounded Theory Analysis of Challenges and Implementation of the Digital-Interpersonal Academic Supervision Model

Informant	Statements	Open Coding	Axial Coding	Selective Coding
Principal of SMAN 1	"We have been using WhatsApp Groups and the GTK Room to communicate supervision schedules, but without face-to-face interaction, teachers feel less personally cared for."	Use of WhatsApp Group, GTK Room, Lack of personal interaction	Utilisation of digital technology in supervision, Interpersonal communication gap	Balancing digital and face-to-face approaches for effective supervision
Teachers at SMAN 1	"If the head teacher tells me directly what needs to be improved, I feel more motivated to do it."	Direct feedback, Teacher motivation	The effect of direct communication on teacher motivation	Direct communication increases teacher enthusiasm and motivation
Principal of SMAN 2	"We combine both methods, so those who cannot use digital tools are still assisted manually, and then we upload the information."	Combination of digital and manual methods, Digital limitations	Digital and manual integration, Addressing infrastructure limitations	Flexible solutions with a blended approach in academic supervision
Deputy Head of Curriculum at SMAN 2	"If it's only digital, teachers often see it as just a formality. But when we invite discussion, that's when the mentoring becomes evident."	Digital formality, The importance of discussion	Challenges in digital communication, Strengthening guidance through discussion	Balancing digital and face-to-face approaches for strengthening guidance
Teachers at SMAN 2	"I often learn from files shared by friends in the WhatsApp group."	Collective learning, Sharing digital materials	Learning through digital means, Collaboration between teachers	Technology supports collaboration, but direct interaction is necessary
Deputy Head of Curriculum at SMAN 3	"Young teachers adapt quickly, but many senior teachers still struggle with uploading documents."	Difficulties faced by senior teachers, Technology adaptation	Digital divide among teachers, need for training	The challenge of the digital divide, the need for training for senior teachers
Principal of SMAN 3	"We document observation results with photos, then store them in a digital folder even though the internet is often slow."	Digital documentation, Internet limitations	Data storage, Infrastructure limitations	Use of technology with infrastructure limitations

Teacher at SMAN 3	"If the supervision schedule and instrument format have been sent in the WhatsApp group, that is very helpful. So during face-to-face meetings, we can focus on the content, not the administration."	Use of WhatsApp, Focus on substance	Efficiency through digitalisation, Reduction of administrative burden	Technology speeds up administration, optimising time for coaching
Principal of SMAN 4	"The internet often disconnects, so we rely more on in-person meetings. But we still document the results with photos and reports uploaded to GTK."	Limited internet access, reliance on face-to-face interactions	Digital limitations, Importance of face-to-face interaction	Reliance on face-to-face meetings, but digital documentation remains
Deputy Headteacher of SMAN 4	"We often conduct personal coaching sessions after classroom observations. Teachers feel more motivated because they feel connected."	Personal coaching, Teacher motivation	Personal development, The influence of close relationships	Strengthening motivation through personal coaching and close relationships with the head teacher
Teachers at SMAN 4	"If it's just uploading, it feels like an assessment, not coaching."	Uploading results, Feeling of being assessed	Feelings of not being valued, Need for real coaching	Effective coaching requires direct interaction
Deputy Head of Curriculum at SMAN 5	"We strive for balance, 50% digital, 50% face-to-face. Teachers find it easier to receive feedback if there are already digital documents, which are then discussed in reflective forums."	Balance between digital and face-to-face, Reflective discussion	Blended supervision, Effectiveness of feedback	A balanced supervision model between digital and face-to-face is more effective
Teachers at SMAN 5	"If there's a WhatsApp notification, it feels more obligatory to do it because everyone can see it."	WhatsApp notifications, Task obligation	The influence of digital technology on teacher engagement	Technology increases teachers' sense of responsibility through task visibility
Principal of SMAN 5	"If everything is digital, teachers get tired quickly. If everything is face-to-face, too much time is wasted. So it has to be Digital-Interpersonal."	Digital fatigue, face-to-face time wastage	Balance between digital and face-to-face	Optimal solution with the Digital-Interpersonal model for effective supervision
Teacher at SMAN 6	"Digital feedback feels impersonal, but when it's face-to-face, I feel more valued and heard."	Digital feedback, the need for empathy	The difference between digital and face-to-face feedback	Face-to-face communication is more effective in building empathy and providing clarification
Teacher at SMAN 6	"I often misunderstand things when I only read comments on the app. After meeting face-to-face, it became	Misunderstandings in digital feedback, Face-to-face clarification	Challenges of digital communication, Need for clarity	Using face-to-face communication to clarify feedback and avoid misunderstandings

| | | | Human | Emphasising the importance of human |
| Deputy Headteacher of SMAN 6 | "Digital is just a tool, not a replacement for human relationships." | Digital as a tool, not a substitute for relationships | development, personal relationships in supervision | relationships in supervision, even though technology helps |

Source: Results of Researcher Data Processing, 2025

Based on interviews with the principal, vice principal for curriculum, and teachers at SMAN 1–6 in Bantaeng Regency, this study found several key findings regarding the challenges and difficulties in implementing the digital-interpersonal academic supervision model. From the interviews conducted, several major issues emerged related to the use of digital technology and interpersonal communication in academic supervision. First, although digital technologies such as WhatsApp Groups and Ruang GTK have been implemented to convey supervision schedules and monitor teacher progress, many principals, as expressed by the principals of SMAN 1 and SMAN 2, acknowledged that without face-to-face communication, teachers feel less personally cared for. Although digital technology helps with administration and documentation, some teachers feel that digital feedback tends to feel cold and lacking in depth.

In this case, face-to-face communication is still considered a more effective way to motivate and provide clear explanations to teachers, especially when facing challenges or misunderstandings in instructions given digitally. In addition, more significant challenges arise due to limitations in digital infrastructure, as experienced by schools such as SMAN 3 and SMAN 4, where internet disruptions and senior teachers' difficulties in using technology are major obstacles. Senior teachers at these schools expressed difficulties in uploading documents or using digital platforms efficiently, highlighting a digital skills gap that needs to be addressed with further training and support. Nevertheless, some principals, such as those at SMAN 4, continue to strive to combine digital and manual methods, with the aim of facilitating teachers who have difficulty with technology.

On the other hand, these findings also show that many schools, such as SMAN 5, have implemented a blended supervision model that combines 50% digital and 50% face-to-face supervision. This is seen as a more effective solution because it combines the advantages of technology in managing administration and documentation, while maintaining the personal interaction needed to provide in-depth feedback and motivation to teachers. The headteacher at SMAN 5 emphasised that the balance between these two approaches can help create more efficient and comprehensive supervision, as face-to-face communication continues to play an important role in building the emotional relationships needed for teacher development. This study identifies that the implementation of a digital-interpersonal model in academic supervision must take into account infrastructure challenges and the digital divide, as well as the importance of maintaining a balance between digital and face-to-face communication. A blended supervision model with a balanced proportion of both is considered the ideal solution for improving the effectiveness of academic supervision in schools with various conditions and challenges.

4.3 The Effectiveness of Face-to-Face Communication in Increasing Teacher Motivation

Face-to-face communication has proven to play a very important role in increasing teacher motivation and building closer emotional relationships between principals and teachers. Many principals and deputy principals of SMAN 4 and SMAN 6 revealed that personal coaching after classroom observations and face-to-face discussions provided teachers with more motivation than relying solely on digital communication. Teachers also felt that digital feedback tended to be cold and unclear, whereas through direct interaction, principals could provide more in-depth explanations about aspects that needed improvement. This shows that face-to-face communication is not only important in providing clear feedback, but also serves as a tool to build empathy and create a sense of appreciation among teachers, which in turn can improve their performance. Therefore, a combination of digital and face-to-face communication in academic supervision, as found at SMAN 5, which adopts a blended supervision model, offers an ideal and balanced approach.

Table 6. Results of the Effectiveness of Face-to-Face Communication in Increasing Teacher Motivation

Informant	Statements	Open Coding	Axial Coding	Selective Coding
Principal of SMAN 1	"We have been using WhatsApp Groups and the GTK Room to communicate supervision schedules, but without face-to-face interaction, teachers feel less personally cared for."	Use of WhatsApp Group, GTK Room, Lack of personal interaction	Digital utilisation in supervision, interpersonal communication gap	Balancing digital and face-to-face methods for effective supervision
Teachers at SMAN 1	"If the headteacher directly	Direct feedback,	The impact of	Direct communication increases

	tells me what needs to be improved, I become more motivated to do it."	Teacher motivation	direct communication on teacher motivation	teacher motivation
Principal of SMAN 2	"We combine both methods, so those who cannot use digital tools are still assisted manually, and then we upload the information."	Combination of digital and manual methods, Digital limitations	Digital and manual integration, Addressing infrastructure limitations	Flexible solutions in academic supervision using a combined approach
Deputy Head of Curriculum at SMAN 2	"If it's only digital, teachers often see it as just a formality. But when we invite discussion, that's when the mentoring becomes evident."	Digital formality, The importance of discussion	Challenges in digital communication, Strengthening through discussion	Balancing digital and face-to-face approaches strengthens guidance
Teachers at SMAN 2	"I often learn from files shared by friends in the WhatsApp group."	Collective learning, Sharing digital materials	Learning through digital means, Collaboration between teachers	Technology supports collaboration, but direct interaction is still necessary
Deputy Head of Curriculum at SMAN 3	"Young teachers adapt quickly, but many senior teachers still struggle with uploading documents."	Senior teachers' difficulties, Technology adaptation	Digital divide among teachers, need for training	Challenges of the digital divide, the need for training for senior teachers
Principal of SMAN 3	"We document observation results with photos, then store them in a digital folder even though the internet is often slow."	Digital documentation, Internet limitations	Data storage, Infrastructure limitations	Use of technology with infrastructure limitations
Teacher at SMAN 3	"If the supervision schedule and instrument format have been sent to the WhatsApp group, it is very helpful. So during face-to-face meetings, we can focus on the content, not the administration."	Use of WhatsApp, Focus on substance	Efficiency through digitalisation, Reduction of administrative burden	Technology speeds up administration, optimises time for coaching
Principal of SMAN 4	"The internet connection is often interrupted, so we rely more on face-to-face meetings. But we still document the results with photos and reports uploaded to GTK."	Limited internet access, Face-to-face interaction	Digital limitations, Importance of face-to-face interaction	Reliance on face-to-face meetings, but digital documentation still exists
Deputy Headmaster of SMAN 4	"We often conduct personal coaching sessions after classroom observations. Teachers feel more motivated because they feel connected."	Personal coaching, Teacher motivation	Personal development, The influence of close relationships	Strengthening motivation through personal coaching and close relationships with the head teacher
Teachers at SMAN 4	"If it's just uploading, it feels like an assessment, not coaching."	Uploading results, Feeling of being assessed	Feelings of not being valued, Need for real coaching	Effective coaching requires direct interaction
Deputy Head of Curriculum at SMAN 5	"We strive for balance, 50% digital, 50% face-to-face. Teachers find it easier to receive feedback if there are already digital documents, which are then discussed in reflective forums."	Balance between digital and face-to-face, Reflective discussion	Blended supervision, Effectiveness of feedback	A balanced supervision model between digital and face-to-face is more effective

Teachers at SMAN 5	"If there's a WhatsApp notification, it feels more obligatory to do it because everyone can see it."	WhatsApp notifications, Task obligation	The influence of digital technology on teacher engagement	Technology increases teachers' sense of responsibility through task visibility
Principal of SMAN 5	"If everything is digital, teachers get tired quickly. If everything is face-to-face, too much time is wasted. So it has to be Digital-Interpersonal."	Digital fatigue, face-to-face time wastage	Balance between digital and face-to-face	Optimal solution with the Digital-Interpersonal model for effective supervision
Teacher at SMAN 6	"Digital feedback feels impersonal, but when it's face-to-face, I feel more valued and heard."	Digital feedback, the need for empathy	The difference between digital and face-to-face feedback	Face-to-face communication is more effective in building empathy and providing clarification
Teacher at SMAN 6	"I often misunderstand things when I only read comments on the app. After meeting face-to-face, it became clear what the headteacher meant."	Misunderstandings in digital feedback, Face-to-face clarification	Challenges of digital communication, Need for clarity	Using face-to-face communication to clarify feedback and avoid misunderstandings
Deputy Headteacher of SMAN 6	"Digital is just a tool, not a replacement for human relationships."	Digital as a tool, not a substitute for relationships	Human development, personal relationships in supervision	Emphasising the importance of human relationships in supervision, even though technology helps

Source: Results of Researcher Data Processing, 2025

Table 4 illustrates the results of interviews with informants consisting of principals, vice principals for curriculum, and teachers at SMAN 1–6 Bantaeng Regency regarding the implementation of the digital-interpersonal academic supervision model. Open Coding was used to identify key issues related to the use of digital technology, interpersonal communication, and teacher motivation. In the Axial Coding stage, these categories were further grouped to connect findings that focused on technological limitations and the important role of face-to-face interaction in providing motivation and guidance. Finally, Selective Coding filtered the main categories to identify the core themes that support an optimal supervision model, namely a balance between digital and face-to-face communication. The main findings from this table show that although digital technologies such as WhatsApp and Ruang GTK can improve efficiency in administration and supervision monitoring, face-to-face communication still plays an important role in providing clear feedback and motivation to teachers. Personal coaching and face-to-face discussions are key factors in building stronger emotional relationships, which in turn improve teacher performance. Therefore, the implementation of a blended supervision model that combines 50% digital and 50% face-to-face is considered the most effective solution for creating more efficient and meaningful supervision.

Based on interviews with the principal, vice principal of curriculum, and teachers at SMAN 1–6 Bantaeng Regency, this study found that face-to-face communication plays a very important role in increasing teacher motivation and strengthening the relationship between teachers and the principal. Although the use of digital technology such as WhatsApp Groups and GTK Rooms helps in delivering supervision schedules and monitoring teacher progress, many informants revealed that without face-to-face communication, teachers feel less personally cared for. The principals at SMAN 1 and SMAN 2 stated that although digital technology provides efficiency in administrative management, teacher motivation is more pronounced when they receive direct feedback from the principal, which provides an opportunity to discuss the results of supervision in greater depth. This indicates that face-to-face communication is very important for providing motivation and personal reinforcement to teachers, which cannot be fully replaced by digital communication.

Another finding that emerged was that although digital technology provides benefits in terms of administrative efficiency, such as scheduling and documentation of supervision, some teachers felt that digital feedback often felt cold and unclear, as expressed by teachers at SMAN 6. They felt more valued and listened to when receiving feedback directly from the head teacher, which allowed them to obtain a more in-depth explanation of the aspects that needed improvement. This shows that although digital platforms serve to simplify administration, face-to-face interaction is still very much needed to build more empathetic relationships and ensure clarity of communication in the supervision process. These findings identify that the most effective digital-interpersonal academic supervision model is one that combines 50% digital and 50%

face-to-face, as implemented at SMAN 5. The headteacher at SMAN 5 emphasised that the balance between digital and face-to-face is crucial because it allows for efficiency in data management and monitoring of teacher progress, while maintaining the personal closeness necessary for providing feedback and motivation to teachers. Thus, the combination of digital and face-to-face supervision is considered an ideal solution for achieving more effective, nurturing, and motivating supervision, which in turn can improve teacher performance and the quality of learning in schools in Bantaeng Regency.
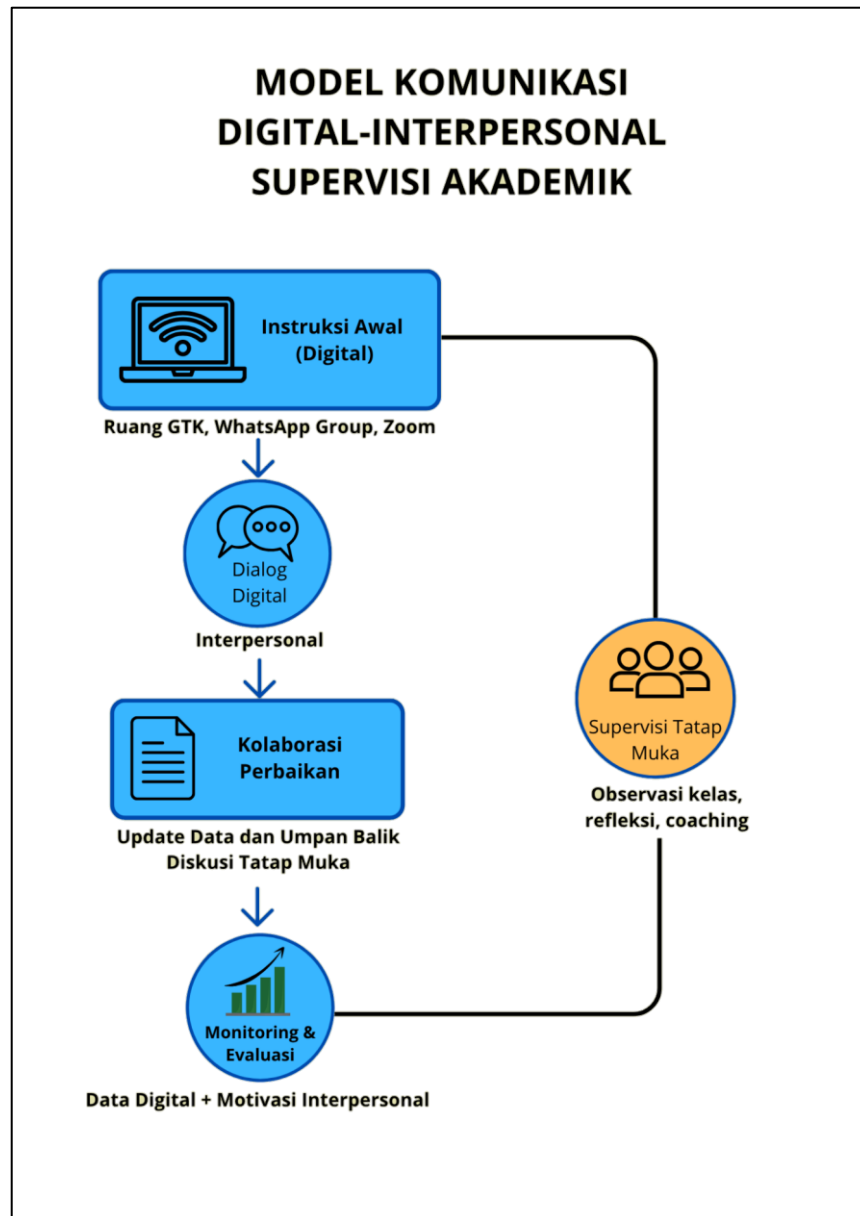
Figure 1: Digital Interpersonal Communication Model For Academic Supervision
Source: Results Of Researcher Data Processing, 2025

Based on the attached image, the digital-interpersonal academic supervision communication model found in this study describes a supervision process that integrates digital and interpersonal elements to achieve effective supervision. This model consists of several interrelated main stages, namely:

1. Initial Instructions (Digital): The supervision process begins with initial instructions delivered through digital platforms such as Ruang GTK, WhatsApp Group, and Zoom. This stage allows the headteacher to convey the supervision schedule, task instructions, and preliminary information needed by teachers. The use of digital technology here ensures that information is received efficiently and documented.

2. Digital Dialogue (Interpersonal): After the instructions are given, the next process is a digital dialogue that strengthens interpersonal communication between the headteacher and teachers. At this stage, digital platforms are used to discuss issues, ask questions, and provide clarification on the instructions that have been given. Although digital communication allows for rapid communication, it is still limited to non-personal interactions, which require further support from face-to-face communication.

3. Improvement Collaboration: Next, after the digital dialogue takes place, the next step is improvement collaboration, where teachers can provide feedback   on the supervision process that has been carried out.

The data collected during the digital dialogue is then updated and integrated into face-to-face discussions, where more detailed feedback and necessary improvements can be focused on. This stage leads to collaborative coaching, where school principals and teachers work together to identify areas for improvement.

4. Monitoring and Evaluation: Once improvements have been made, the next stage is monitoring and evaluation, which combines digital data and interpersonal modifications. This process includes ongoing monitoring of teacher development and evaluation of changes that have occurred following the implementation of supervision. Digital data provides objective measurements, while interpersonal communication helps to provide context and interpretation of the data, ensuring that evaluations are not based solely on numbers, but also on a deeper understanding.

5. Face-to-Face Supervision (Observation, Reflection, and Coaching): Finally, the supervision process ends with face-to-face supervision, which involves direct observation, reflection, and coaching by the headteacher. This stage is crucial because it provides direct feedback, allowing for more empathetic and personal interaction between the headteacher and the teacher. Classroom observation, reflection on previous supervision results, and coaching help teachers improve the quality of their teaching and strengthen their motivation.

Conclusion Findings: The model of digital-interpersonal academic supervision communication found in this study shows that a balance between digital technology and face-to-face interaction is essential in achieving effective supervision. Digital technology enables administrative efficiency and progress monitoring, while face-to-face communication is important in providing motivation, personal feedback, and more in-depth coaching. These two elements complement each other and need to be integrated with the right balance to ensure optimal professional development for teachers.

V. DISCUSSION

Based on interviews with principals, vice principals for curriculum, and teachers at SMAN 1–6 in Bantaeng Regency, the main findings of this study reveal that although digital technology provides many conveniences in administrative management and supervision monitoring, face-to-face communication still plays a very important role in increasing teacher motivation and building stronger interpersonal relationships. Most principals and deputy principals, as found in SMAN 1 and SMAN 2, revealed that although they utilise digital platforms such as WhatsApp Groups and Ruang GTK to convey supervision schedules and document supervision results, teachers often feel that they are not given enough personal attention without direct communication. This shows that face-to-face communication is still very important in providing deeper motivation and feedback, which cannot be fully replaced by technology. Teachers revealed that the digital feedback they received tended to feel cold and unclear, whereas face-to-face communication allowed them to obtain clearer explanations about aspects that needed improvement.

The challenges that emerged from this study were related to the limitations of digital infrastructure in several schools, such as SMAN 3 and SMAN 4, where internet disruptions and senior teachers' difficulties in using digital platforms became significant obstacles in the implementation of the digital-based supervision model. This digital skills gap shows that although technology has great potential to improve administrative efficiency and supervision monitoring, there is still a digital divide that needs to be addressed through more intensive training and technical support for teachers, especially those who are less familiar with technology. On the other hand, some school principals, such as those at SMAN 4, rely on face-to-face meetings to establish more personal relationships with teachers, given the limitations of digital infrastructure and the need to maintain emotional connections in the supervision process. These findings indicate that to create effective supervision, a balanced approach is needed, taking into account the digital infrastructure conditions in each school and teachers' ability to adapt to technology.

This study supports the concept of blended supervision, which combines digital-based and face-to-face supervision, as the most effective model for implementing academic supervision. At SMAN 5, the headteacher stated that a supervision model with a 50% digital and 50% face-to-face composition is the ideal solution to overcome infrastructure challenges while maintaining personal relationships between headteachers and teachers. Thus, this blended supervision approach optimises the benefits of digital technology in administration and monitoring, while also paying attention to interpersonal aspects, which are very important in teacher motivation and professional development. Digital technology provides convenience and efficiency, while face-to-face interaction provides a more empathetic and clear relationship. This model leads to the understanding that to achieve effective and comprehensive supervision, these two approaches must be combined according to the conditions and needs of the school.

The findings of this study are highly relevant to the Diffusion of Innovations Theory developed by Everett Rogers. According to this theory [21], [22], innovations (in this context, the application of digital technology in academic supervision) will be more quickly accepted and adopted by individuals or groups if they can be adapted to the needs, conditions, and characteristics of users. In this case, SMAN 1–6 Bantaeng Regency faces challenges in adopting digital technology for academic supervision due to differences in infrastructure and digital skills among teachers, especially in schools with limited internet networks and technological devices. According to the Theory of Innovation Diffusion, there are several factors that influence the adoption of innovation [23], [24] namely relative advantage (the relative advantage of the innovation compared to old practices), compatibility (the compatibility of the innovation with the values and needs of individuals

or groups), complexity (the level of difficulty in using the innovation), trialability (the ability to try the innovation on a small scale), and observability (the ease of observing the results of using the innovation).

In the context of this study, the findings show that schools such as SMAN 1 and SMAN 2, which rely more on digital platforms such as WhatsApp Groups and Ruang GTK, feel that technology provides a relative advantage in terms of administrative efficiency and monitoring teacher progress. However, although digital communication is recognised as providing practical benefits, there are still challenges related to infrastructure limitations and digital skill gaps that hinder the full adoption of this technology, especially at SMAN 3 and SMAN 4, where internet disruptions and difficulties in uploading documents are obstacles. This reflects the compatibility and complexity factors in innovation diffusion theory, where digital technology needs to be adapted to the capabilities and infrastructure available in schools. In addition, this study also notes that the principal at SMAN 5 successfully implemented a blended supervision model with 50% digital and 50% face-to-face, which allows digital technology to document supervision and face-to-face interaction to provide personal feedback and motivation. This is in line with the principle of trialability in innovation diffusion theory, where innovations are tested on a small scale and accepted with gradual adaptation, allowing the implementation of digital technology to be tailored to local conditions and teacher needs.

The findings of this study indicate that digital technologies such as WhatsApp Groups and GTK Rooms facilitate monitoring and administrative supervision, but face-to-face communication remains crucial in boosting teacher motivation and providing more personalised and clear feedback. This is in line with the findings in the research by [25], which found that even though technology is used for administration, school principals still rely on direct communication to motivate and provide more in-depth guidance to teachers. Furthermore, research by [10] emphasising the importance of communication skills in academic supervision supports our findings regarding the importance of balancing digital and face-to-face communication. In this study, they found that effective communication in supervision requires empathy and the ability to give clear instructions. This is related to the findings at SMAN 5, which adopted a blended supervision model with 50% digital and 50% face-to-face, optimising the power of digital technology in administration and documentation and face-to-face communication in providing feedback and motivation to teachers. The Theory of Innovation Diffusion suggests that innovations that can be adapted and tested on a small scale, such as the blended supervision model, will be more readily accepted, as they offer ease of management while maintaining the interpersonal closeness that is essential in supervision.

Furthermore, findings from research by [20] on the Edmodo application-based supervision model in primary schools are also relevant to our findings on the use of digital technology in academic supervision. They suggest that the use of technology can improve teacher competence through digital interaction, albeit with some challenges related to limitations found in areas with limited technology access. These findings are very similar to the challenges faced by SMAN 3 and SMAN 4, which have digital infrastructure constraints and rely on face-to-face interaction more often due to internet disruptions. This illustrates the importance of the concept of trialability in Diffusion of Innovations theory, which states that innovations must be trialled on a small scale and adapted to local conditions before being fully accepted.

The theoretical implications of this study suggest that the Diffusion of Innovations Theory can be applied to understand how digital technology is integrated into academic supervision and how it is adopted by teachers in various conditions. The findings indicate that digital innovations in supervision must be adapted to local needs and infrastructure limitations in schools, and require a balance between digital and face-to-face methods to create more effective supervision. Although this study provides new insights into the application of the digital-interpersonal supervision model, its weakness lies in the limitation of generalising the findings only to schools in Bantaeng Regency, which has a very specific infrastructure and social context. Therefore, future research directions could focus on the application of a more comprehensive supervision model in various regions with more diverse conditions, as well as further research on training strategies to improve teachers' digital skills, so that technology can be accepted more effectively and improve the quality of academic supervision more broadly.

VI. CONCLUSION

This study focused on the implementation of a digital-interpersonal academic supervision model at SMAN 1–6 in Bantaeng Regency, with the aim of analysing the role of digital technology and face-to-face communication in increasing teacher motivation and supervision effectiveness. Based on the findings, this study concludes that although the use of digital technology in supervision provides many administrative and monitoring conveniences, face-to-face communication remains a key factor in providing clear feedback, more personal motivation, and deep emotional relationships between principals and teachers. Limitations in digital infrastructure and difficulties in adaptation among senior teachers are the main challenges faced in implementing this model, indicating that the application of technology in academic supervision must take into account local conditions and teachers' needs. The significance of these findings lies in the development of a blended supervision model with a balance between digital and face-to-face, which not only improves administrative efficiency but also maintains the personal relationships necessary in the supervision process. This model shows that combining the two can create more effective supervision, higher motivation, and better teacher performance. However, this study has weaknesses in terms of the limitations of generalising the

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findings only to schools in Bantaeng Regency, which has a very specific infrastructure and social context. Therefore, future research could expand the scope of the study to include various regions with more diverse conditions, as well as focus on digital training strategies to improve teachers' skills in using technology. Thus, this study paves the way for further development of digital-based academic supervision that can be applied more broadly in different educational contexts.

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REFERENCES

[1] P. R. Muthuswamy, New age education models: Innovation and reform in the 21st century. Notion Press, 2022.

[2] Z. F. Sumampouw and M. V. Tudus, "Innovation and Transformation of Educational Supervision in the 21st Century: Analyzing the Transformation of Social Dynamics of Teachers-Students and Institutional Authority," J. Paradig. J. Sociol. Res. Educ., vol. 6, no. 1, pp. 456–465, 2025, doi10.53682/jpjsre.v6i1.11776.

[3] R. Zhong and Y. Zhao, "Education Paradigm Shifts in the Age of AI: A Spatiotemporal Analysis of Learning," ECNU Rev. Educ., vol. 8, no. 2, pp. 319–342, Jun. 2025, doi: 10.1177/20965311251315204.

[4] A. Fedorova, O. Koropets, I. Kacane, G. Eremenko, and A. Ovchinnikov, "Digitalization of Educational and Managerial Processes in Higher School: Challenges Faced by Academic Staff," in 14th International Technology, Education and Development Conference, Mar. 2020, pp. 3449–3455. doi: 10.21125/inted.2020.0978.

[5] H. Sanoto, M. C. Paseleng, and D. Kusuma, "The Effectiveness of Si Sagu (Teacher Academic Supervision System) in Academic Supervision Process for Teachers at 3T Area," J. Innov. Educ. Cult. Res., vol. 3, no. 4, pp. 548–553, Jul. 2022, doi: 10.46843/jiecr.v3i4.157.

[6] E. M. Kormos, "The Unseen Digital Divide: Urban, Suburban, and Rural Teacher Use and Perceptions of Web-Based Classroom Technologies," Comput. Sch., vol. 35, no. 1, pp. 19–31, Jan. 2018, doi: 10.1080/07380569.2018.1429168.

[7] Rasdiana et al., "Elevating Teachers' Professional Digital Competence: Synergies of Principals' Instructional E-Supervision, Technology Leadership and Digital Culture for Educational Excellence in Digital-Savvy Era," Educ. Sci., vol. 14, no. 3, p. 266, Mar. 2024, doi: 10.3390/educsci14030266.

[8] B. R. Aditya, R. Ferdiana, and S. S. Kusumawardani, "Identifying and prioritizing barriers to digital transformation in higher education: a case study in Indonesia," Int. J. Innov. Sci., vol. 14, no. 3/4, pp. 445–460, Sep. 2022, doi: 10.1108/IJIS-11-2020-0262.

[9] R. V. Imbar, S. H. Supangkat, A. Langi, and A. A. Arman, "Digital transformation readiness in Indonesian institutions of higher education," World Trans. Eng. Technol. Educ., vol. 20, no. 2, pp. 101–106, 2022.

[10] A. Mahatika and A. Asmendri, "How Well Communication Works in Academic Supervision?," Al-Idarah J. Kependidikan Islam, vol. 12, no. 2, pp. 164–172, 2022, doi: 10.24042/alidarah.v12i2.14149.

[11] Zalli Zalli and Pahlawan Pahlawan, "The Influence of Principal Communication and Principal's Academic Supervision on Teacher Performance in South Pemulutan," Int. J. Educ. Dev., vol. 2, no. 1, pp. 66–78, Jan. 2025, doi: 10.61132/ijed.v2i1.267.

[12] P. Isbianti and D. E. Andriani, "Jurnal Manajemen Pendidikan Pelaksanaan Supervisi Akademik oleh Kepala Sekolah Menengah Pertama Negeri di Klaten Jawa Tengah Academic Supervision Practices of Junior High School Principals in Klaten , Central Java," J. Manaj. Pendidik., vol. 3, no. 1, pp. 75–85, 2021.

[13] Alwiyati, "Penggunaan Supervisi Akademik Berbasis Teknologi Informasi Komunikasi (Tik) Dalam Meningkatkan Kemampuan Guru Melaksanakan Pembelajaran Di Sdn Kuin Cerucuk 5 Banjarmasin," Julak J. Pembelajaran dan Pendidik, vol. 1, no. 2, pp. 1–16, 2021.

[14] Milasari, L. Hasibuan, K. A. Us, and H. Wahyudi, "Prinsip-prinsip Supervisi, Tipe/Gaya Supervisi, Komunikasi dalam Supervisi Pendidikan dan Supervisi Pendidikan Islam Milasari," Indones. J. Islam. Educ. Manag., vol. 4, no. 2, pp. 45–60, 2021.

[15] M. J. Alam, A. K. M. M. Haque, and A. Banu, "Academic Supervision for Improving Quality Education in Primary Schools of Bangladesh: Concept, Issues and Implications," Asian J. Educ. Soc. Stud., vol. 14, no.

4, pp. 1–12, 2021, doi: 10.9734/ajess/2021/v14i330359.

[16] H. Usman, M. Mudhofir, and I. Gusmian, "The Important Role of Academic Supervision in Improving the Quality of Education," Kontigensi J. Ilm. Manaj., vol. 11, no. 2, Dec. 2023, doi: 10.56457/jimk.v11i2.459.

[17] N. Karnati, "Academic Supervision To Improve The Competence Of Elementary School Teachers," Australas. J. Educ. Technol., vol. 35, no. 1, p. 35, 2019.

[18] S. Norawati, Zulher, and Mikasi, "The Impact of Interpersonal Communication and Academic Supervision on Enhancing Teacher Performance," Edunomika, vol. 09, no. 01, pp. 1–13, 2025, [Online]. Available:
http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI

[19] S. Sermal and M. Yunus, "Bridging Technology and Pedagogy: A Study on Virtual Academic Supervision for Teacher Professional Growth," AL-ISHLAH J. Pendidik., vol. 17, no. 2, pp. 1844–1853, Apr. 2025, doi: 10.35445/alishlah.v17i2.7207.

[20] M. M. W. S. Dewi, Y. Dwikurnaningsih, and M. Waruwu, "Academic Supervision Model Based on Edmodo Application," J. Educ. Technol., vol. 7, no. 1, pp. 109–120, Apr. 2023, doi: 10.23887/jet.v7i1.52794.

[21] E. M. Rogers, A. Singhal, and M. M. Quinlan, "Diffusion of innovations," in An integrated approach to communication theory and research, Routledge, 2014, pp. 432–448.

[22] R. L. Miller, "Rogers' Innovation Diffusion Theory (1962, 1995)," 2015, pp. 261–274. doi: 10.4018/978-1-4666-8156-9.ch016.

[23] J. A. García-Avilés, "Diffusion of Innovation," Int. Encycl. Media Psychol., no. May, pp. 1–8, 2020, doi: 10.1002/9781119011071.iemp0137.

[24] J. P. Wisdom, K. H. B. Chor, K. E. Hoagwood, and S. M. Horwitz, "Innovation Adoption: A Review of Theories and Constructs," Adm. Policy Ment. Heal. Ment. Heal. Serv. Res., vol. 41, no. 4, pp. 480–502, Jul. 2014, doi: 10.1007/s10488-013-0486-4.

[25] B. I. Sappaile et al., "Influence of implementation of academic supervision by the school supervisor, interpersonal communication, and teacher motivation on the quality of learning in secondary high schools in regency of South Buton, Indonesia," J. Educ. Res. Rev., vol. 6, no. May, pp. 29–37, 2018.