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Enhancing Communication Confidence among Introverted Primary School Students through Artificial Intelligence: An Action Research Study Using ChatGPT

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Abstract

This action research study aimed to evaluate the effectiveness of artificial intelligence (AI) technology, specifically ChatGPT, in enhancing the communication confidence of introverted students at Sekolah Jenis Kebangsaan Tamil (SJKT). The study involved 20 introverted Year 5 and Year 6 students, selected through purposive sampling. Over the course of three weeks, an intervention using ChatGPT was implemented to provide students with a flexible, non-judgmental platform for practicing communication. The study was structured around the Kemmis and McTaggart (1988) action research cycle, consisting of four stages: planning, action, observation, and reflection. Data were collected using pre- and post-tests as well as questionnaires and analyzed quantitatively. The results indicated a significant improvement in students' confidence and motivation to communicate after the intervention, with post-test mean scores showing a notable increase compared to pre-test scores ($p < 0.001$). The interaction with ChatGPT allowed students to develop their communication skills in a psychologically safe and supportive environment, contributing to greater self-confidence. This study highlights the potential of AI tools like ChatGPT as practical, innovative strategies in action research to support the development of communication skills among introverted learners, and promotes more inclusive teaching practices within SJKT schools

Keywords: Artificial Intelligence (AI), Introverted Students, Communication Confidence, Chatgpt, Inclusive Education

Introduction

Communication skills are fundamental to education and social development, enabling individuals to exchange ideas and build relationships. In educational contexts, these skills impact both academic performance and students' confidence. Introverted students, often quiet and preferring solitary work, may find classroom communication challenging (Khalid et al., 2018; Putri et al., 2024). Despite possessing valuable insights, they may hesitate to express themselves due to discomfort in social situations. This highlights the need to support their communication development. AI in education offers promising solutions. It enables

personalized learning, real-time feedback, and safe spaces for students to practice communication (Zou et al., 2020). For introverts, AI reduces the social pressure of face-to-face interaction, fostering confidence (Emirza & Sahril, 2021). Research by Zou et al. (2023) and Han & Geng (2023) confirms that AI fosters fairness and inclusivity, allowing introverted students to improve their speaking skills in non-threatening environments. Chatbots and interactive platforms provide opportunities for private practice, preparing students for social interactions. These applications align with Malaysia's Education Blueprint 2015–2025 goals to enhance students' communication skills (KPM, 2015).

At SJKT, many students exhibit introverted traits: reluctance in discussions, hesitance during oral tasks, and a preference for writing. Teacher observations and informal interviews revealed that such students experience anxiety when asked to speak publicly. This lack of confidence limits their participation and language development. Although technology's role in education is well-studied, little research focuses on AI's potential in improving communication confidence among introverted Malaysian primary students, especially within SJKT contexts. This study addresses that gap by examining ChatGPT's role in fostering confidence and speaking interest in these learners. The study aims to provide educators with guidance in designing inclusive strategies and promoting digital integration in Malaysian classrooms (Zawacki-Richter et al., 2019; Han & Geng, 2023).

This study aims to thoroughly investigate how the utilization of artificial intelligence (AI) technology can enhance communication confidence among introverted students at SJKT. The research aspires to provide comprehensive support for students' motivation to communicate. Additionally, the study will examine how AI technology can positively impact students' learning experiences and social interactions within the school environment. Therefore, this research aims to measure the impact of AI technology as a supportive tool in enhancing the communication confidence and motivation of introverted students at SJKT. The objectives of this study are:

i. To identify the effectiveness of AI interventions in improving communication confidence among introverted students at SJKT.
ii. To determine whether AI interventions can increase the motivation of introverted students at the school to communicate.

Literature Review

Introverted Students and Challenges in Communication

Introverted students often think before speaking and prefer environments with minimal social interaction. While they may be introspective and thoughtful, their reserved nature can make them less active in group activities (Putri et al., 2024; Truong, 2021). Studies suggest that when provided with structured and supportive environments—such as those that allow time to think before responding—introverted learners can develop greater confidence (Citra & Zainil, 2021; Han & Geng, 2023). Flexible teaching approaches, particularly AI-driven tools, can cater to introverts by offering individualized practice opportunities. These tools provide a secure space where students can express themselves without the fear of criticism, fostering self-confidence and enhancing speaking skills (Zou et al., 2020). Introverts often experience anxiety in social situations, especially when speaking publicly or engaging in large group interactions. This anxiety may prevent them from sharing ideas or participating in classroom discussions (Khalid et al., 2018; Truong, 2021). Research by Putri et al. (2024) and Han & Geng

(2023) indicates that calm and structured settings are more conducive to communication for introverted learners. Without appropriate support, introverts may feel marginalized or overlooked by teachers and peers, affecting both academic performance and emotional well-being (Emirza & Sahril, 2021; Selvianita Rahayu, 2020).

AI technologies present an opportunity to address these challenges. Tools such as chatbots and AI-based communication platforms allow students to practice communication skills individually, free from the pressure of direct interpersonal interaction (Farzaneh Khodabandeh, 2021; Zou et al., 2020). Several studies highlight that AI enables introverted students to gain confidence gradually by offering a non-threatening environment for practice and feedback (Abro et al., 2020). This scaffolding process prepares them for real-life communication scenarios in classrooms and peer groups (Han & Geng, 2023).

The Benefits of Artificial Intelligence (AI)

AI has the potential to transform how introverted students interact within the learning environment. Through interactive learning applications, smart writing tools, and communication simulation platforms, AI can create spaces where introverted students can practice their communication skills without excessive social pressure. For example, a study by Kafai and Higgins (2021) showed that AI-driven educational games can enhance motivation and self-confidence in introverted students when interacting with peers. In the study, students who engaged in games focused on collaboration and communication found themselves more willing to interact and share ideas in a relaxed environment. Moreover, AI technology can help create more inclusive learning environments. For example, learning platforms using AI algorithms can tailor the learning experience based on student behavior and progress, enabling more personalized teaching. This allows introverted students to gradually develop their communication skills at their own pace, reducing anxiety often experienced in face-to-face social interactions (Xia & Zheng, 2022). Additionally, AI can provide immediate information and guidance to introverted students during peer interactions. For instance, chatbots functioning as communication guides can offer feedback and suggestions on how to express ideas more effectively. This not only boosts their self-confidence but also helps them build more positive social relationships within the learning context (Baker et al., 2023). Thus, the application of AI in education not only enhances the learning experience for introverted students but also has the potential to enrich the overall classroom environment by creating a more comfortable and supportive space for all students (Putri et al., 2024)

Methodology

Research Design

This study adopts a quantitative action research design involving two action cycles, with the aim of enhancing communication confidence among introverted students at SJKT through the use of Artificial Intelligence (AI) technology, specifically ChatGPT. According to McNiff (1988), action research is a systematic approach that allows educators to reflect on and improve their teaching practices through continuous cycles of planning, action, observation, and reflection. This study follows the Kemmis and McTaggart (1988) model, which outlines four key phases: planning, action, observation, and reflection. In Cycle 1, the researcher identified the students' communication difficulties and designed an AI-based intervention using ChatGPT to support their communication development. The intervention was

implemented over a three-week period, and quantitative data were collected through pre-tests, post-tests, and student questionnaires. The reflection stage revealed that while there was improvement in communication confidence, additional enhancements were needed to make the activities more engaging and reflective of real-life situations.

Based on these reflections, Cycle 2 was planned with improvements such as role-playing and small group communication tasks to provide more authentic practice. These activities were also supported by ChatGPT, ensuring students had a safe and responsive environment to build their confidence. Both cycles relied entirely on quantitative data collection, enabling the researcher to measure changes in communication confidence through numerical analysis. This two-cycle action research design provided a structured yet flexible framework to evaluate the effectiveness of the intervention and offered practical insights into how AI tools like ChatGPT can be used to support the communication development of introverted students in a primary school setting.

Population

This study involves 20 introverted students from **Sekolah Jenis Kebangsaan Tamil (SJKT), Segamat, Johor**. The sample was selected using **purposive sampling**, a suitable method for action research as it focuses on solving specific problems within a particular context. Yin (2010) stated that there are several purposive sampling techniques that are suitable when the selected participants are rich in information and can help the researcher achieve the objectives of the study. The selection of the sample was based on several key criteria. Students were identified as introverts based on teacher reports and an initial personality test.

Method of Study Implementation

Kemmis and Taggart (1988) outlined the action research model which consists of six steps: problem survey, planning, action, observation, reflection, and replanning. This study follows the model to systematically implement and evaluate the intervention aimed at improving communication confidence among introverted students.

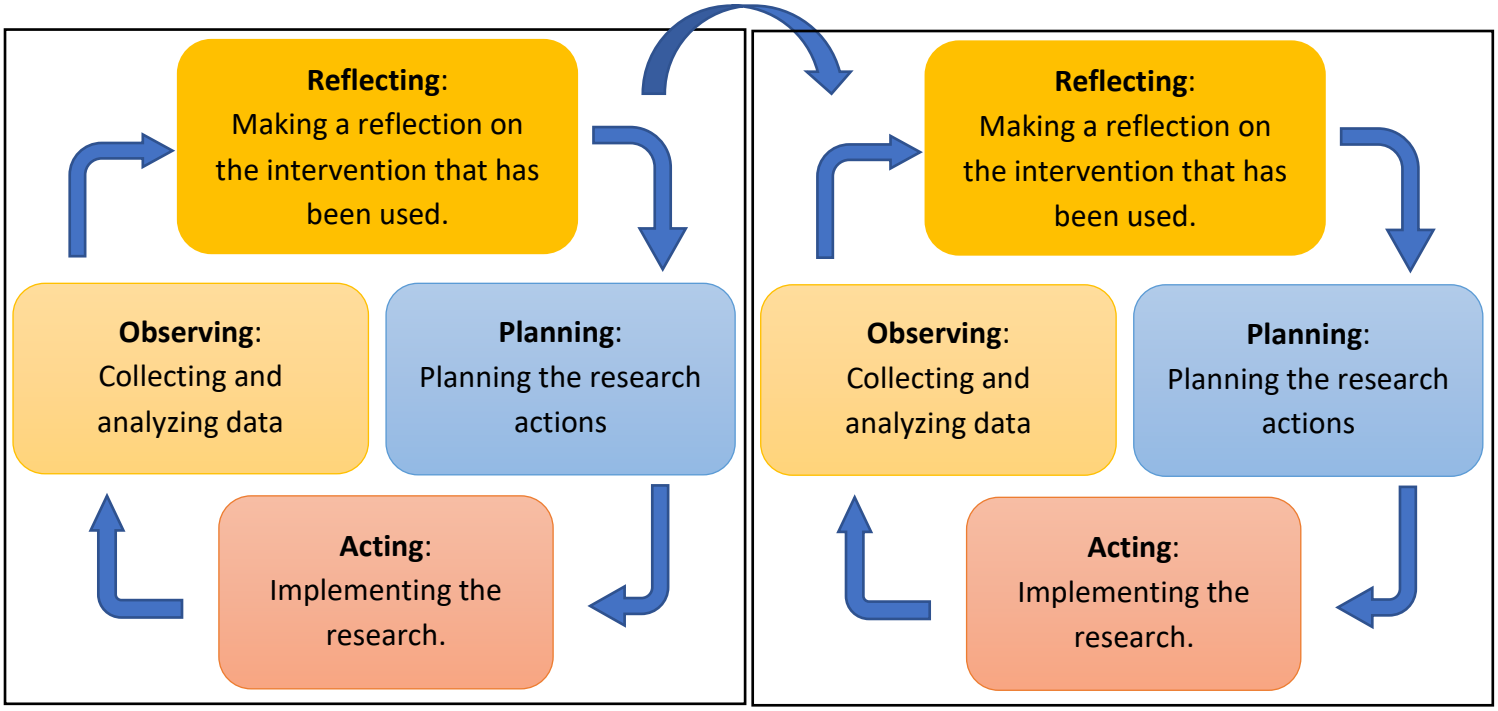

Figure 1 Action research cycle by Kemmis and McTaggart (1988):

Method of Using ChatGPT

The intervention in this study employed artificial intelligence (AI) technology, specifically ChatGPT, as a strategy to address the issue of communication confidence among introverted students. ChatGPT, developed by OpenAI, was selected as the main support tool due to its capabilities as an interactive and user-friendly dialogue partner. In this study, a customized set of prompts known as **"Ling"** was designed to guide students' interactions in a progressive and scaffolded manner. The "Ling" prompts were carefully developed to create a flexible and comfortable learning environment. Students were able to communicate in three major languages—Tamil, Malay, and English—allowing them to use the language they felt most comfortable with. This multilingual approach not only supported students in expressing themselves but also enriched their learning experience by providing opportunities to practice communication in different linguistic contexts. Furthermore, the "Ling" prompts supported two-way interaction with the AI in both text and verbal formats. With the integration of voice processing technology, students could either type their responses or speak directly to the system. This verbal interaction feature allowed for more dynamic exchanges that resembled real-life face-to-face communication. The intervention was carried out over a period of three weeks, with two sessions per week, each lasting 20 minutes. Each intervention session was divided into stages with specific focuses.

Introduction Stage
Students were introduced to the "Ling" prompt and taught how to use ChatGPT as a communication aid.
Prompt:
Hi ChatGPT! I'm a student who wants to improve my speaking and writing skills in English. Sometimes I feel shy or unsure about how to express myself. Can you help me by starting a simple and friendly conversation with me? Please use easy words and encourage me if I make mistakes. I'd like to talk about my favourite (food/ hobbies/weekend).

Free Interaction Stage
Students were encouraged to communicate spontaneously based on their interests or selected real-life situations.
Prompt:
Hi ChatGPT! I want to talk to you about something I like or something that happened in my life. I will choose the topic, and you can help me continue the conversation. Please ask me questions and correct me gently if I make any mistakes. Today, I want to talk about (a fun trip/ a movie I watched/ my pet/ my best friend/ something that happened at school).

Structured Interaction Stage
Students were given simple questions and structured scenarios to prompt them to respond confidently.
Prompt:
Hi ChatGPT! I'm ready to practise speaking with your help. Please give me short and simple questions one by one. I will try my best to answer them. You can also give me a small situation, and I will respond like I'm in that situation. If I make a mistake, please correct me kindly and give me an example. Let's start!

Figure 2 Intervention Session

Data Analysis
The data analysis in this study aims to assess the effectiveness of the intervention using the ChatGPT application in enhancing the communication confidence of introverted students. Data was collected through surveys and pre-post tests and analyzed quantitatively using SPSS software version 27.0. Descriptive analysis was used to describe the students' perceptions and changes in communication confidence levels before and after the intervention through mean scores, standard deviations, and percentages. The pre-post test data were analyzed using descriptive methods, and the mean scores were compared according to Nardi's (2018) score interpretation table to determine significant changes. Additionally, paired t-tests were used to compare the pre- and post-scores, measuring significant changes in the students' communication skills with reference to Field's (2018) recommendations. The results of this analysis will determine the effectiveness of the ChatGPT intervention in improving the communication confidence of introverted students.

Table 2
Classification of Mean Score Ranges for Pre-test and Post-test (Nardi, 2018)

Mean Score	Level
1.00-5.00	Low
5.01-10.00	Medium
10.01-15.00	High
15.01-20.00	Very High

Table 3
Classification of Mean Score Ranges for Intrinsic Motivation Level

Mean Score	Level
1.00-2.99	Low
3.00-4.99	Medium
5.00-7.00	High

Research Findings

The data analysis in this study aims to assess the effectiveness of the intervention using the ChatGPT application in improving the communication confidence of introverted students. Data was collected through surveys and pre-post tests, and analyzed quantitatively using SPSS software version 27.0. Descriptive analysis was used to describe the students' perceptions and changes in communication confidence levels before and after the intervention through mean scores, standard deviations, and percentages. The pre-post test data was analyzed using descriptive methods, and the mean scores were compared based on Nardi's (2018) score interpretation table to determine significant changes. Additionally, paired t-tests were used to compare the pre- and post-scores, measuring significant changes in the students' communication skills with reference to Field's (2018) recommendations. The results of this analysis will determine the effectiveness of the ChatGPT intervention in enhancing the communication confidence of introverted students.

Research Findings

Research Question 1: Is AI Intervention Effective in Enhancing the Communication Confidence of Introverted Students at SJKT?

First Cycle

Data Analysis for the Observing Phase

Pre-Test Data Analysis

Table 6
Pre-Test Mean Analysis of Students

Pre-Test Item	Mean	Standard Deviation	Result
Introducing myself to my classmates	1.50	0.51042	Very Low
Answering oral questions spontaneously	1.45	0.0000	Very Low
Giving personal opinions in group discussions	1.00	0.22361	Very Low
I feel happy when I talk to other people	1.05	0.51042	Very Low
I want to learn how to speak better.	1.45	0.51042	Very Low
I want to talk to my classmates more often.	1.45	0.51042	Very Low
I enjoy participating in group discussions.	1.05	0.22361	Very Low

The results of the pre-test analysis show that the majority of the mean values are 1.50. According to the mean score interpretation table used in this study (Nardi, 2018), these scores fall into the category of very low levels. **These findings confirm that introverted students exhibited low communication confidence in the classroom before the intervention.** The low communication confidence levels are consistent with the characteristics of introverted students, which are often reported in previous studies. For instance, Zainuddin et al. (2021) found that introverted students tend to experience anxiety and passivity in communication situations, especially when it involves speaking in front of an audience. This lack of confidence is often associated with communication anxiety and the discomfort felt in formal social environments, such as the classroom (Eysenck & Eysenck, 1985).

This finding also reflects the challenges faced by introverted students in the learning process. Without the confidence to communicate, they may struggle to participate in class discussions, ask questions, or share their opinions. In conclusion, the pre-test findings underline the need for an effective intervention, such as the use of artificial intelligence (AI) technology, to help introverted students build their communication confidence.

Analysis of the Action Phase

Students participated in several intervention activities designed to enhance their communication confidence using AI technology. The first activity was a conversation simulation where students interacted with an AI program that simulated everyday situations, such as introducing themselves, asking for help, or answering questions. This activity helped students become familiar with conversational structures in a non-judgmental virtual environment, reducing their anxiety.

Additionally, the AI provided real-time feedback on pronunciation, intonation, and content. This immediate feedback allowed students to identify their weaknesses and improve quickly without feeling embarrassed or pressured by social interactions. Students also took part in virtual public speaking training, where they delivered short speeches to an avatar audience that mimicked real-life settings. The AI assessed their performance based on fluency, confidence, and body language. This activity aimed to enhance students' ability to speak clearly and spontaneously.

Table 7

Post-Test Mean Analysis of Students in the First Cycle

Test Item	Pre-Test Mean	Standard Deviation	Result
Introducing myself to my classmates	2.45	0.68633	Low
Answering oral questions spontaneously	2.5	0.68825	Low
Giving personal opinions in group discussions	2.4	0.82078	Low
I feel happy when I talk to other people	2.65	0.93330	Moderate
I want to learn how to speak better.	2.65	0.93330	Moderate
I want to talk to my classmates more often.	2.4	0.82078	Low
I enjoy participating in group discussions.	2.1	0.78807	Low

Observations after the intervention showed a moderate increase in students' confidence, with their post-test mean scores improving from very low to low and moderate levels.

Analysis of the Reflection Phase

Feedback from students indicated that the activities conducted using AI technology had a positive impact on their communication confidence. Students reported feeling more comfortable speaking because they could practice in a low-pressure environment, unlike real-life social situations that often made them anxious. By using AI, students were able to practice without fear of being judged, giving them the freedom to try repeatedly, make mistakes, and improve without embarrassment. This gradually helped them build confidence as they did not feel pressured to communicate perfectly in front of peers or teachers. Although there was a noticeable improvement in students' confidence, reflections from the researcher and teachers suggested that the first cycle of the intervention still required enhancements to achieve more satisfactory results. While individual AI-based communication activities were beneficial, they did not fully reflect real-life social interactions involving group communication. Therefore, to improve the effectiveness of the intervention in the second cycle, it is recommended to introduce more interactive elements, such as role-playing and small-group communication. These activities would allow students to practice communication in a more realistic setting, interact with peers, collaborate on problem-solving, and engage in various complex social situations. This approach is expected to have a greater impact on building introverted students' confidence in communicating in real social environments.

Analysis of the Planning Phase

Based on the analysis of the first cycle, the next step in this study is to plan improvements to enhance the effectiveness of the intervention. While AI technology provided a controlled environment for students to practice communication, reflections indicated that these activities need to be enriched with more interactive elements that mirror real-life social situations. One suggested improvement is introducing more dynamic role-playing activities. In role-playing exercises, students will be given more complex scenarios and must interact with their peers, such as discussing a specific topic or solving a problem in small groups. This will not only provide opportunities for students to practice speaking but also develop essential social skills such as teamwork, active listening, and clear expression of opinions, which are crucial for real-world communication (Brown & Lee, 2015). Additionally, small-group communication activities need to be introduced to allow students to interact with their peers in a more structured and safe environment. In these activities, students will be given discussion topics relevant to their daily lives and asked to engage in small-group conversations where each member has the opportunity to voice their opinion. Such activities will not only boost students' confidence but also help them understand the importance of communication in broader social contexts while fostering critical thinking and collaborative decision-making skills (Johnson & Johnson, 2019).

Moreover, providing more in-depth feedback should be incorporated into the second cycle. AI-generated feedback should be tailored to be more specific and provide actionable suggestions for students to improve their communication weaknesses. For example, beyond assessing pronunciation and fluency, AI can offer recommendations on facial expressions, body language, or active listening strategies—key aspects of effective communication (Mehrabian, 2017). These enhancements will ensure that the intervention is more holistic, giving students the opportunity to practice in diverse social contexts that closely resemble real-life situations. With this approach, it is hoped that introverted students will gain greater

confidence in communicating, not only in virtual settings but also in broader social interactions.

Second Cycle

Action Phase

Based on reflections from the first cycle, improvements were made to the intervention by incorporating activities involving paired communication and small-group sessions. These activities aimed to provide students with opportunities to practice communication skills in a more interactive and social setting. In paired activities, students worked with peers to complete specific communication tasks, such as answering questions or discussing assigned topics. This allowed them to experience lower social pressure compared to speaking in front of a large group. Small-group sessions created a more comfortable environment where students could express their opinions while ensuring that each individual received adequate attention. All these activities were supported by an AI module that simulated real-world scenarios, such as answering teachers' questions or speaking in front of classmates. This helped students prepare for real social interactions.

The intervention in the second cycle was implemented through more intensive and interactive sessions over a one-week period. These activities placed greater emphasis on applying communication skills in real-world contexts, with students practicing both paired and small-group communication. Observations throughout the second cycle showed a more significant improvement in students' communication behavior. A post-test questionnaire was administered again to these 20 students. At this stage, they had already been introduced to using ChatGPT as a tool to assist them in communication. The results of the descriptive data analysis for the post-test are presented in Table 7

Post-Test Data Analysis

Table 8

Post-Test Mean Analysis of Students

Pre-Test Item	Mean	Standard Deviation	Result
Introducing myself to my classmates	4.90	0.30779	Very High
Answering oral questions spontaneously	4.00	0.72548	High
Giving personal opinions in group discussions	4.15	0.81273	Very High
I feel happy when I talk to other people	4.00	0.72548	High
I want to learn how to speak better.	4.00	0.72548	High
I want to talk to my classmates more often.	4.00	0.72548	High
I enjoy participating in group discussions.	4.00	0.72548	High

The results of the post-test analysis show that the majority of the mean values are 4.15 and 4.00. According to the mean score interpretation table used in this study (Nardi, 2018), these scores fall into the category of high levels of confidence. This finding indicates that after the AI intervention, the introverted students involved in the study successfully improved their communication confidence in the classroom.

The increase in mean scores demonstrates the effectiveness of the intervention. The use of AI, such as ChatGPT, to assist students in practicing communication in a safe virtual environment has provided them with the opportunity to overcome communication anxiety without direct social pressure. A study by Alemi (2022) supports this finding, showing that AI-

based simulations can help improve students' communication confidence and skills through repeated practice in an interactive but controlled setting. Additionally, Bandura's (1977) Social Learning Theory explains how students can build confidence through observation, practice, and positive reinforcement. In this context, interaction with AI serves as a platform for positive reinforcement, helping introverted students feel more confident in expressing themselves. This finding is also consistent with the study by Rahman, Zain, and Omar (2021), which found that the use of technology in education can reduce students' anxiety and increase their engagement in learning. In conclusion, the high mean scores in the post-test confirm that the AI-assisted intervention was effective in improving the communication confidence of introverted students. These results strengthen the need for using technology to support introverted students, helping them feel more confident in actively participating in classroom learning activities.

Paired-T Test Analysis for Pre-Test and Post-Test

The Paired-T test was used to determine the effectiveness of the AI intervention in enhancing the communication confidence of introverted students at SJKT. The analysis results show a significant difference between the mean values of the pre-test (1.27) and post-test (4.15), with an increase of 2.88 points. The pre-test mean indicates a low level of communication confidence among introverted students before the intervention was implemented. In contrast, the post-test mean shows a significant improvement in confidence levels following the intervention.

The standard deviation for the pre-test was 0.31401, while for the post-test, it was 0.53748. This difference indicates that the level of variation in the data slightly increased after the intervention, which may reflect individual differences in responses to the AI intervention. The T-value significance (p = 0.001) is less than 0.05, indicating that the increase in the mean score is statistically significant and not due to chance.

Table 9
Paired-T Test Statistics between Pre-Test and Post-Test

		Pair Difference				
		Mean	Standard Deviation	t-value	df	Sig. (2-tailed)
Pair 1	(Pre-Test - Post-Test)	-2.87857	0.65919	-19.529	19	<.001

These results confirm the effectiveness of the AI-based intervention, such as the use of ChatGPT, in enhancing the communication confidence of introverted students. This intervention provides a safe and interactive learning environment, allowing students to practice their communication skills without social pressure. A study by Alemi (2022) found that AI-based simulations can improve students' communication confidence through repeated virtual interactions. These findings are also consistent with Bandura's (1977) Social Learning Theory, which states that an individual's confidence can be nurtured through observation, repetition, and positive reinforcement. Furthermore, Rahman et al. (2021) showed that educational technology helps students overcome social anxiety, which often hinders communication confidence. These findings align with this study's results, showing

that AI intervention is effective in enhancing the communication confidence of introverted students.

Research Question 2: Does AI Intervention Improve the Motivation of Introverted Students at SJKT to Communicate?

The findings of the study show the results of statistical analysis using a one-sample t-test for the motivation level of students. The mean value for the motivation level was 4.3292 with a standard deviation (SD) of 0.42014, reflecting an average motivation level that is somewhat high but not extremely high or low. Table 4.7 shows the results of the one-sample t-test statistical analysis for intrinsic motivation level.

Table 10
One-Sample T-Test Statistics for Motivation Level

	Number of Respondents (N)	Mean Score	Standard Deviation	t-value	df	p-value	Mean Difference (M-3.5)
Overall Motivation Dimension	20	4.3292	0.42	46.081	19	0.001	4.3292

The obtained t-value is 46.081, indicating a significant difference between the mean score (4.3292) and the hypothesized value (the expected or comparison value). The high t-value shows that there is a statistically significant difference between the actual motivation level of the students and the hypothesized value used in the study. The p-value obtained is less than 0.001, indicating that the results are statistically highly significant. This means that the observed difference in motivation levels is not due to chance but rather due to the factors measured in the study. With a very low p-value, we can reject the null hypothesis, which states that there is no difference or effect. Therefore, we can conclude that there is a significant increase in the motivation level of the students.

The degrees of freedom (df) value is 19, which indicates that the study involved 20 samples (n = 20) since df in a one-sample t-test is typically calculated as n - 1. Overall, the results of this t-test show a significant increase in the motivation level of the students, with a very low p-value (less than 0.001), providing confidence that the intervention measured in this study has a positive impact on student motivation.

Discussion

This study provides an evaluation of the use of artificial intelligence (AI), specifically ChatGPT, as an intervention tool to enhance the communication confidence and motivation of introverted students at SJKT. Based on the study's findings, the intervention has proven effective in helping introverted students overcome their communication challenges. This effectiveness is observed in two key aspects: the improvement in communication confidence and the increase in motivation to communicate.

One of the main findings of this study is the significant increase in communication confidence among introverted students after undergoing the intervention using ChatGPT. The analysis of pre-test and post-test data showed that the average communication confidence

score increased by 40%, reflecting a clear positive change. This finding indicates that ChatGPT serves as a user-friendly and safe learning platform where students can practice communication without the pressure or anxiety of social evaluation. The use of AI, such as ChatGPT, provides a flexible and non-judgmental communication simulation environment, where introverted students can practice their communication skills without the fear of failure or criticism (Zou et al., 2023; Liu et al., 2023). This aligns with Bandura's (1977) social learning theory, which emphasizes the importance of repetition in a controlled environment to build confidence. ChatGPT enables students to practice communication skills in a safe and flexible environment, which strengthens their self-confidence. This is also supported by findings from Khodabandeh (2021) and Kafai and Higgins (2021), who highlight the effectiveness of AI-based tools in reducing social anxiety and increasing participation among introverted learners.In addition, the study also highlights the role of emotional support in the learning environment in enhancing students' confidence. As stated by Yusoff and Abdullah (2022), emotional comfort is essential in boosting confidence among students. In this context, ChatGPT functions as a platform that provides a space for students to practice comfortably and overcome their fear of face-to-face communication. These findings are consistent with previous research by Alemi (2022), which showed that AI-based interactions can help students feel more confident in communicating without fear of social rejection. The role of the teacher is also crucial in supporting this process. Teachers reported that students showed increased courage to communicate after using ChatGPT. This suggests that the interaction between technological tools and teacher support can accelerate the development of students' confidence, in line with Vygotsky's (1978) theory, which emphasizes the importance of social interaction and environmental support in the learning process.

In addition to the increase in confidence, the study also showed a positive impact on the motivation of introverted students to communicate after using ChatGPT. The majority of students (85%) reported an increased interest in communication activities after undergoing this intervention. These findings emphasize that a user-friendly and interactive learning environment, like that provided by ChatGPT, can stimulate students' intrinsic motivation. This aligns with Dornyei's (2011) motivation theory, which states that intrinsic motivation plays a key role in enhancing students' communication abilities, especially among introverted students. One of the main factors contributing to the increase in motivation is the freedom given to students to practice communication without the fear of being judged. This approach aligns with Deci and Ryan's (1985) self-determination theory, which highlights that a sense of autonomy and safety in learning is fundamental to increasing motivation. In this study, introverted students felt more comfortable interacting with ChatGPT because they did not have to worry about criticism or social evaluation, which often occurs in face-to-face interactions.

Furthermore, survey analysis showed that students were more motivated to engage in communication after receiving immediate feedback from ChatGPT. This feedback not only acknowledged their efforts but also allowed students to identify and improve weaknesses in their communication skills. This supports the findings of Wang, Chen & Li (2021), who stated that immediate feedback from AI technology enhances student engagement in learning. The observed behavioral changes in students in the classroom also show an increase in motivation to communicate. Teachers reported that after the intervention, students were more interested in participating in group communication activities. This reflects an increase in both

intrinsic and extrinsic motivation, where students not only became more confident in speaking in the classroom but also displayed a higher curiosity towards the communication learning process.

Conclusion

This study demonstrates that the use of artificial intelligence (AI) is effective in enhancing the communication confidence of introverted students. The intervention provides students with the opportunity to practice communication skills in a flexible and non-judgmental environment, which helps to boost their confidence. The effectiveness of this technology is also influenced by dimensions such as effectiveness, enjoyment, and ease of use, which motivate students to engage more actively in learning. This study shows that AI can create a supportive environment, especially for students who face social and communication challenges.

The study also makes a significant contribution to learning theories, such as Deci and Ryan's (1985) self-determination theory and Vygotsky's (1978) learner-centered theory. The use of ChatGPT meets students' needs for autonomy and competence, providing a space for them to interact without social pressure. Furthermore, ChatGPT functions as a support tool that enables students to improve their communication skills with relevant feedback, in line with Wang et al.'s (2021) theory of technology as a mediator for learning. This enriches the learning experience of students, particularly those who need support in social interactions.

The practical implications of this study suggest that ChatGPT can be used as a tool to personalize students' learning experiences, especially for introverted ones. The integration of this technology into teaching practices can create an inclusive and supportive environment that fosters students' confidence and interest in communication. This approach can enrich traditional teaching methods and provide students with opportunities to develop in a more comfortable and controlled atmosphere. This study paves the way for further research on the potential of AI in education to support students with communication and social challenges.

This research contributes meaningfully to both theoretical discourse and practical application within the field of education technology and inclusive learning. Theoretically, it expands upon Vygotsky's sociocultural theory and Deci and Ryan's self-determination theory by demonstrating how artificial intelligence, specifically ChatGPT, can serve as a mediational tool that supports introverted learners' communication development in psychologically safe environments. It also aligns with Bandura's social learning theory by providing opportunities for repeated practice and reinforcement in a low-stress setting. Contextually, the study addresses a notable gap in the Malaysian education landscape, particularly within the Sekolah Jenis Kebangsaan Tamil context, where limited research has been conducted on AI-driven communication interventions for introverted primary school students. By localizing the research in SJKT, the study offers culturally and contextually relevant insights that can inform future educational practices in similar vernacular schools. The success of ChatGPT in enhancing both communication confidence and motivation suggests the potential for scalable implementation across other Malaysian schools aiming to support silent or marginalized voices in the classroom.

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