Development of Gemini AI as a Virtual Assistant in a Student's WhatsApp Discussion Group

1st Ilham Alifian Firmansyah*
BPS Statistics Sulawesi Utara
BPS Statistics
Manado, Indonesia
ilham.alifian@bps.go.id

*Corresponding author: ilham.alifian@bps.go.id
Received: 2024-11-24; **Accepted:** 2025-07-17

Abstract— **Introduction: WhatsApp is a social media platform that is frequently used in Indonesia. The ease of use of WhatsApp makes people of any group of age groups use it. WhatsApp also has a group feature that can be used as a discussion platform. Most students in Indonesia joined a WhatsApp group either to share information or discuss their school tasks. But not all their WhatsApp group have their teacher as a group member because sometimes they feel uncomfortable discussing something when their teacher is in the same group. So, we need a virtual assistant to help the students answer their questions while discussing. One of the most used virtual assistants is Google Gemini AI. So, researchers recommend integrating Google Gemini AI and students' WhatsApp discussion groups. Aim of the study: To develop a virtual assistant to increase the effectiveness of students' discussion, providing information, answering questions, or guiding them to complete their task. Method: The method used in this research development is the waterfall. Results: The Researcher successfully developed the virtual assistant and worked as planned; it answers any question when the group participant mentions it in the WhatsApp group chat room. Conclusion: The virtual assistant has a big scalability to develop; it can be trained to a specific major, depending on its group. For the next study, researchers recommend imposing a limitation so the students do not abuse their power.**

Keywords*— *Gemini AI, WhatsApp, Education, Virtual Assistant

I. INTRODUCTION

Education is a transmission of knowledge, skills, and character traits and manifests in various forms. It is a process that begins at birth and continues until the end of life [1]. Education has different characteristics in each country. In Indonesia, the government has implemented a policy to increase school access, funding, and a high rate of school enrolment with 12 years of compulsory [2]. With the government policy, Indonesian literacy rate increased from 96,04 to 96,25 in 2022, mean years of schooling increased from 8,97 to 9,08, and net enrolment ratio increased from 61,65 to 61,97 for the senior high school [3].

Education is the fundamental method of social progress and reform, through education society can formulate its own purposes, can organize its own means and resources, said John Dewey in O'Dubshslaine [4]. People need a good education to be able to survive in this competitive world [5]. With a good education, people will have a good knowledge and easier to get a job or do anything because of their intelligence. With the aim of increasing education, discussion was needed to give a knowledge-sharing between students or students with teachers.

Discussion is a systematic and purposeful interactive oral process; the exchange of ideas, thoughts, and feelings takes place through oral communication [6]. With the discussion process, the educational material will be easier to understand. Discussion can be started with some methods, such as online and offline. Offline discussion is usually used in a school, tutoring place, or even in a small group of people. Online discussion is used to discuss without time or space limitations, usually used after the last Covid-19 pandemic to discuss from any place on the planet. Online discussion made it easier for us to ask something to someone who has better knowledge. One of the platforms used in online discussions is WhatsApp groups.

WhatsApp group is a feature that combines multiple chats into one group chat, so everyone can see the chat from any of the group members without moving into another chat room. Indonesia is one of the countries that uses WhatsApp as the most used application for contacting other people online. Since WhatsApp has been acquired by Facebook, WhatsApp users has increased from 103 million in 2012 to 2.482 million users in 2023 worldwide. In 2023, Indonesia reached 112 million WhatsApp users and ranked 3rd in terms of the most users by country. Its use is not limited to communicating with family and friends, but also becomes an important tool in business, public services, and education [7]. Cited from Tirto.co.id, We Are Social Data Digital Indonesia 2024 showed that WhatsApp was used by Indonesian respondents with 90,9% proportion [8].

A WhatsApp bot is an autonomous system that can reply to WhatsApp messages from the latest keyword sent by the user. A WhatsApp bot can be deployed in a WhatsApp group to help manage the group. But the WhatsApp bot must be set up before being used to make sure it can answer the question as good as we expected. A WhatsApp bot can be integrated with some other application to help it grow.

Gemini AI is one of the artificial intelligence models developed by Google. Gemini AI has 92% learnability and 85,52% satisfaction in a very good category [9]. Gemini AI,

also known as a personal assistant used in Android smartphones right now. With Gemini AI capabilities, it can answer anything that we ask very good and fast. Some people also use Gemini AI to help them understand their education material.

Gemini AI is a valuable addition to educational technologies. Gemini can pave the way for a future technology that empowers personalized learning experiences for all by prioritizing human-centered design and standards [10]. Gemini AI can be combined with some technology, like a WhatsApp bot. By using a WhatsApp bot that is integrated with Gemini AI and joined to a group chat, when student send a specific keyword, Gemini AI will help to answer their questions and help them to discuss.

Seeing this opportunity, the researcher decided to create a simple virtual assistant using a WhatsApp bot as an auto-replying system and integrated with Gemini AI for the Large Language Model (LLM) to help students answer their questions while in discussion for a small time to wait. They do not have to call their teacher or friend and wait for their answer if they have an auto-replying WhatsApp bot virtual assistant. The model used can be a good assistant if we give the Gemini AI system a prompt way to answer the questions about class material only. Gemini can resist answering questions which is not in the study material, to make sure they are not abused by the student.

II. METHODOLOGY

Developing a system needs a specific method. It does not resemble other research that uses a quantitative and qualitative method. Developing a system needs some steps to prepare, analyze, build, and evaluate the system before implementation. So, to build a good system, the method used in this research is the waterfall method.

To make sure the system has been developed as planned, we need to use a testing method on it. This application needs to be tested in its feature, so the researcher must make sure the output has been written correctly. One of the testing methods is black box testing. This method can be used to see the output without seeing the programming code.

Lastly, this study wants to compare our system with another recent study that uses Gemini AI, a WhatsApp bot, or another relevant topic. With comparison, we know whether this study supports the recent study or does not support it. When we do a comparison, we can know the privilege of this study compared to the recent one.

A. *Waterfall Method*

The waterfall method is one of the System Development Life Cycle (SDLC) methods that is often used in a lot of system information or software development. This model uses a systematic and sequential approach. Started with planning and closed with maintenance, which was done gradually. Because of it, the waterfall method will be the suitable method used in this research [11].

As we see on the Fig. 1, there are 6 steps in the waterfall method, such as requirements, design, implementation, verification and testing, and deployment & maintenance. All the steps must be done before we can move into another step; that's why the waterfall method is a good method when we want to make a product in less time. But we must make sure the requirements of the steps are fulfilled before moving into another step, because we cannot go back to the previous step.

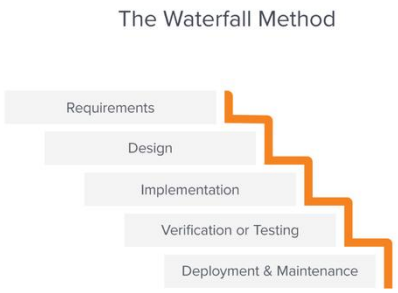

Fig. 1. Implemented Waterfall Method

As we can see in Fig. 2, the waterfall method was implemented in the research with some details. The research started from collecting system needs, and then we made a workflow that accommodates the system needs. After the workflow is created, we connect the workflow with the WhatsApp API and the Gemini API, so the system can work properly as planned. Blackbox testing is used to check if the features have been worked on or not. Lastly, we scheduled maintenance every 3 months to add a feature or fix a bug.

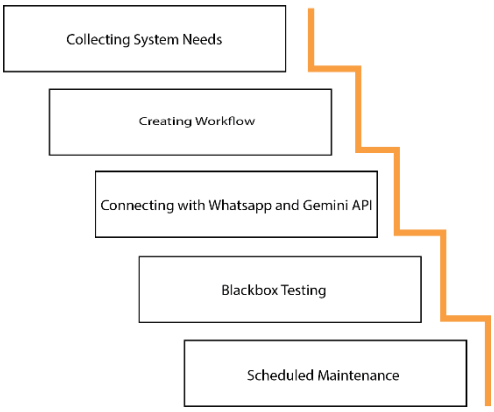

Fig. 2. Implemented Waterfall Method

B. *Blackbox Testing Method*

Blackbox testing is one of the testing method used in system development that focus on the system behavior based on the functional needs of the system [12]. Blackbox testing is designed using a use case approach; it validates the output from some input given [13]. Black box testing was used in this study because the aim of the study is to create a virtual assistant using a WhatsApp bot that integrates with Gemini AI, so we need to make sure the output is correct and works as planned.

Journal of Electrical, Electronic, Information, and Communication Technology (JEEICT)
Vol. 07 No. 2, October-2025, Pages 39-45 DOI: https://dx.doi.org/10.20961/jeeict.7.2.95453

C. *Comparison Qualitative Method*

The qualitative method is a way to explore and provide a deeper, comprehensive, and detailed description of phenomena. The qualitative method is also known as a case study because a detailed, in-depth investigation of the event [14]. One of the qualitative methods is comparison, which compares 2 research studies and gathers information from them. The current research can agree or disagree with the hypothesis from recent research. The result of the comparison gives a new insight into information.

III. Results and Discussion

After a long step to do this research, this is the result of our research.

A. *Result*

After a long stage of development, we have successfully developed the virtual assistant using a WhatsApp bot that is integrated with Gemini AI to help students in discussions. The details of system development, testing, and comparison with the recent study written below.

1) System Development

System development using the waterfall method has 5 main steps.

a) Requirement

In the requirement stage, we have collected the requirements needed for the virtual assistance. First, we need a fast response assistant. Second, we need an assistant who can give a correct answer. Third, we need an assistant to give an explanation in easier words to understand. Last, we need an assistant who can create an image if needed by students.

With that requirement, we can set a limitation to this research, so we can make sure the developed assistant will be as good as planned.

b) Design

This virtual assistant will be called “Vita”. Vita is an acronym for “virtual assistant”. Vita will be a WhatsApp business account that will be invited to a group discussion room chat. After joining a group chat, Vita can answer the question.

The design of this assistant is that when we trigger it by sending a specific word in the room chat, the assistant will respond quickly to the question. The example is when we type a question mentioning the assistant account, the assistant will answer it quickly. If we type in the room chat that contains “!image,” it will give an image response.

In the testing stage, we will set the Vita limitation to answer chat because of its daily usage limit. For the next study, we hope that researchers can have a better experience by using the pay-as-you-go service in Gemini AI, so we can use this assistant for anyone, anywhere, at any time.

c) Implementation

In Fig. 3, we can see the workflow of this assistant; it can be separated into 3 main parts. The first one is a webhook. Webhook used to gather received message information like sender, time, message, etc. Webhook will be triggered if someone sends a chat to any chat room on the Vita account. After being triggered, the webhook will send the information to the next step, which is group or personal chat checking.

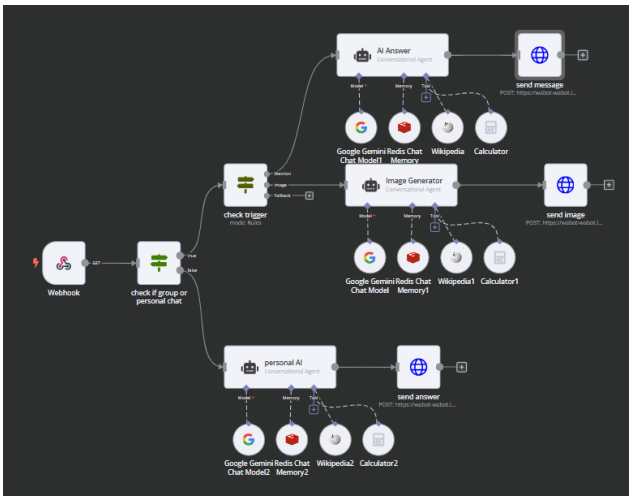

Fig. 3. Workflow

The second part is a group chat. If a group chat is detected by the sender's number, Vita will check the message body, if it contains a mention of Vita, “!image”, or not. If the message mentions Vita, Vita will answer the question in the message body. If the message contains “!image”, Vita will respond with an image. But, if none of those words are triggered, Vita will not be doing anything to make sure it is not spamming or disturbing the discussion in the room chat.

The last part is a personal chat. If Vita detects a personal chat received, it will answer it quickly. Vita will only answer with text to limit its API quota. Vita will have a system prompt to only answer questions about study material and reject any questions.

d) Verification or Testing

The verification or testing will be detailed explained in the System Testing part below. Testing method using blackbox testing with 4 main testing targets, which are: response time, answer text, answer image, and work normally with no errors.

Vita can successfully answer every chat that mentions her, as we can see in Figure 4 above. Vita can reply with low delay after we send a message.

From Figure 5, we know that Vita can send an image with a larger delay. The photo generated by Vita also has a weakness, but it will be better soon when the model is updated.

As we can see in Fig.6, Vita did not answer any chat which is not mention her. So, every chat used by a user in the group will not be disturbed by Vita.

Journal of Electrical, Electronic, Information, and Communication Technology (JEEICT)
Vol. 07 No. 2, October-2025, Pages 39-45 DOI: https://dx.doi.org/10.20961/jeeict.7.2.95453

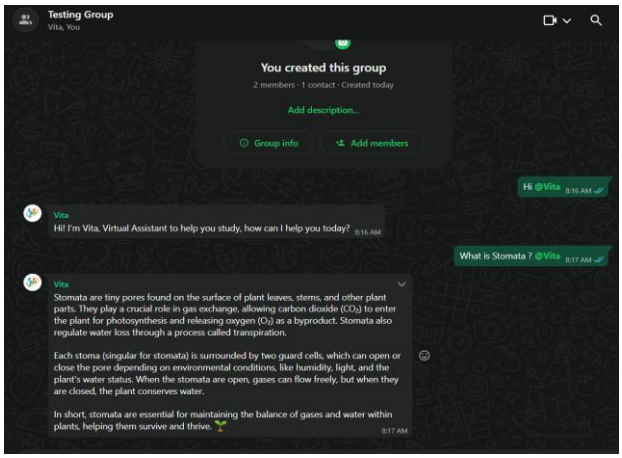

Fig. 4. Testing sending a message in a group chat with mention

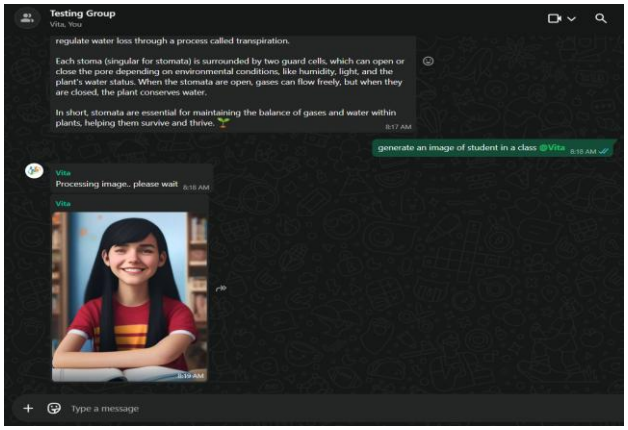

Fig. 5. Testing image generation

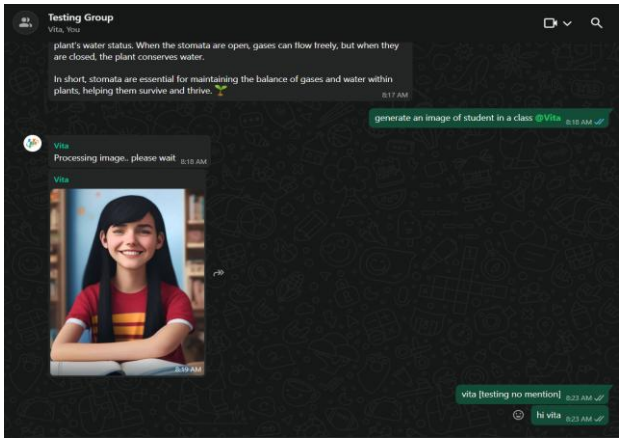

Fig. 6. Testing sending a message with no mention

In Figure 7, we can see that Vita can reply to the direct message or private chat with no error. Vita can answer the message with no mention needed.

In Figure 8, Vita can send a message that was scheduled before. Vita can send the message at the correct time with no error.

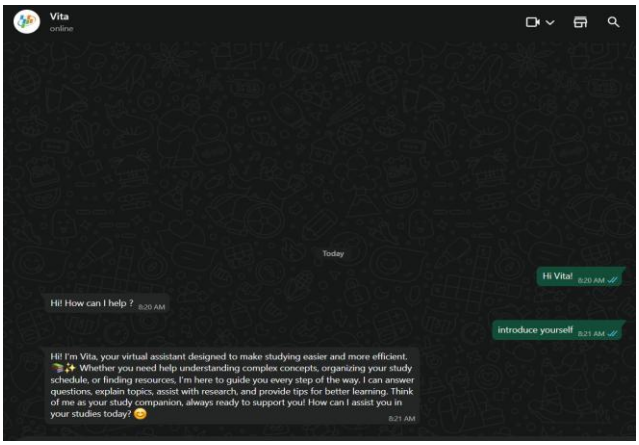

Fig. 7. Testing direct message

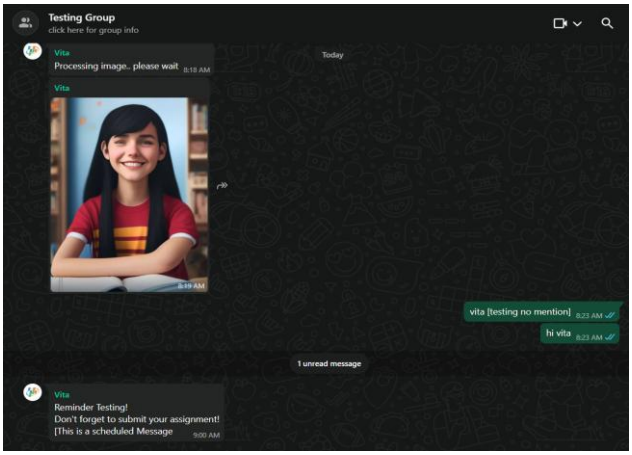

Fig. 8. Testing Scheduled Message

e) Deployment and Maintenance

After the testing step, Vita is deployed and can be used by anyone. Vita can be invited to a group chat by adding Vita directly. When Vita has been added, we can start asking her with a mention or using "!image". In this research, Vita is hosted on a virtual private server and uses a small amount of memory to minimize service charges. Vita is also using the Gemini AI flash version, which is free for limited usage.

In the deployment stage, we give a disclaimer message to inform that every answer was generated by AI. We also suggest using a professional teacher as a supervisor to check the answer. As time goes by, Vita will learn about the question and typical answer students like. Vita will give a better answer, so the teacher can let the rest go to Vita.

Maintaining Vita is simple; we must check the server status. Make sure the server is online and the connection between WhatsApp API and the WhatsApp account is working. To make this step easier, we managed to do this maintenance on the first day of the month. We also create a form to get feedback using this assistant.

Journal of Electrical, Electronic, Information, and Communication Technology (JEEICT)
Vol. 07 No. 2, October-2025, Pages 39-45 DOI: https://dx.doi.org/10.20961/jeeict.7.2.95453

2) System Testing

Blackbox testing method used in this research. As we can see in Table 1, there are 4 main subjects to test. The first one answering the question, we expected Vita to answer the question in the group room chat after the mention. After we did some trials, we got a successful status. Vita is working correctly with sending answers to the right group with a small delay of response rate at 3s on average, after the question is sent.

TABLE I. BLACKBOX TESTING RESULT

Test Subject	Expected	Status	Average Respond Rate
Answering Question	Answer the question after the mentioned	Success	3s
Generating Image	Send the image after it is triggered	Success	60s
Differentiate group or private chat	No need to mention to answer the question in private chat	Success	2s
Sending morning quote	Send a morning quote to the specified group chat	Success	-

Data gathered by the researcher

Second, we try to test the image sending response. We expect that Vita can send an answer using an image after they use the "!image" trigger. Vita is working correctly as planned and has a larger average delay than the first testing subject at 60 seconds.

Third, we try to ask Vita in private chat. With expectation, we do not need to trigger anything to get an answer while asking in private chat. Vita is working correctly with a faster average response rate at 2s, better than answering questions in the group room chat. It is caused by the switch method and the larger data exchange in group chat.

Lastly, we try to send a morning quote or a reminder to a specific group. We expect that Vita sends the message to the correct group at the right time. Vita was working correctly according to the plan. We cannot see the response rate because it's scheduled.

3) Comparison

Saryana created a similar project in his research that uses NLP and a chatbot for an undergraduate student. In his research, he uses a self-developed AI to assist in answering the question. But, it's limited to some questions that have been set in the learning stage of the model [15]. In this research, we use Gemini AI that has been learned for a long time, so the answer will be more natural than other AI. Gemini AI is also learning as time goes by, so it will be better each day we use it.

Chatbot has great potential to change the modern educational landscape. Teachers and students feel a significant impact after using a chatbot in the educational system. Chatbots can improve efficiency and interaction with the learning material [16]. In this research Chatbot was integrated with Gemini AI. Chatbot is also connected to a WhatsApp account, so a lot of people will not need another training to use the chatbot.

Learning method of a lot of schools still uses a book, despite the technology has greatly improved. Chatbot based on AI was hard to implement because a lot of students and teachers are not used to using technology like an AI [17]. But in this research, we create a WhatsApp account assistant that is easier to use, so everybody who has the WhatsApp application can use it easily.

B. Discussion

The integration of the virtual assistant Vita, powered by Gemini AI, with a WhatsApp bot presents an innovative approach to enhancing learning experiences in group chats. Vita is designed to assist students and educators by providing real-time answers in response to queries. Users in a WhatsApp group can simply mention Vita, and she will respond with precise and relevant information. Additionally, Vita comes equipped with a special trigger, "!image", that allows users to request and receive images based on their needs, making the learning process more dynamic and engaging.

Previous studies have highlighted the limitations of traditional chatbots in educational contexts. Suryana's research demonstrated the use of NLP-based chatbots that relied on predefined responses, resulting in limited interaction. In contrast, Gemini AI, which powers Vita, has benefited from extensive training over several years by Google. This continuous improvement allows Vita to offer increasingly accurate answers as more interactions take place, setting her apart from earlier models that lacked the adaptability and growth potential of modern AI systems [14].

Suryanto's work also showed that the introduction of chatbots in educational settings brought significant improvements. Chatbots can boost both learning efficiency and user engagement by streamlining access to learning materials. Our research builds on these findings by integrating the chatbot with a WhatsApp bot, a platform that is highly familiar and widely used by students and teachers. This makes the system more accessible, reducing the learning curve associated with adopting new technologies, which is a key challenge in chatbot implementation [15].

Aldwinarta's research emphasized the difficulty of introducing chatbots into classrooms, as both teachers and students often struggle with new technology. However, by leveraging WhatsApp's ubiquity, our approach simplifies the integration process. The use of a familiar interface lowers the barriers to technology adoption, allowing both students and educators to focus more on the content and less on learning a new platform. The WhatsApp bot is an effective bridge between advanced AI and user-friendly communication tools [16].

Research by Sukiman also said that Gemini AI significantly improves the participant's understanding of learning material. Additionally, participants responded positively to the delivery of the material and the training methods used. They were enthusiastic and actively engaged

Journal of Electrical, Electronic, Information, and Communication Technology (JEEICT)
Vol. 07 No. 2, October-2025, Pages 39-45 DOI: https://dx.doi.org/10.20961/jeeict.7.2.95453

throughout the training after using Gemini AI. Ultimately, the initiative is expected to positively impact the quality of learning [17].

Sukiman's research supports the idea that Gemini AI was a better option to improve the quality of study and discussion between students or even teachers. WhatsApp bot is also the right bridge to help people easily access this Gemini AI, so we do not need other fee to create a training. But there is still a chance to abuse its power. So, we hope that the teacher can supervise students when using it.

In conclusion, the integration of Vita with WhatsApp using Gemini AI provides a powerful tool for enhancing the educational experience. Vita's ability to handle natural language queries, coupled with the image retrieval feature, adds significant value to learning environments. This approach not only capitalizes on AI advancements but also addresses the practical concerns of accessibility and ease of use, making it a promising solution for modern education.
Identify applicable funding agency here. If none, delete this text box.

IV. Conclusion

A virtual assistant using a WhatsApp bot that integrated with Gemini AI was developed successfully. The virtual assistant (Vita) can provide help, like answering questions and giving an image as a response. Vita was limited to answering only school material, and it could refuse to answer random questions. Vita has a small response time around 2,0 – 60,0 seconds, depending on its questions and connection.

Vita still has limitations, such as free API limit and response time, operating cost, and security. This study only writes about the development and usefulness of this virtual assistant, but we hope that the next study can consider API, maintenance cost, and security improvement.

Acknowledgment

I would like to express my sincere gratitude to BPS Statistics for providing invaluable data and support in the completion of this research. Their commitment to ensuring accurate and reliable statistical information has greatly contributed to the depth and credibility of this study. I deeply appreciate their assistance in accessing essential resources and their dedication to advancing statistical knowledge, which has been instrumental in shaping the findings of this work.

References.

[1] H. Arslan, An Introduction to Education, Cambridge: Cambridge Scholars, 2018.

[2] V. S. &. A. H. Yahya, "Indonesian Education Landscape and the 21st Century Challenges," Journal of Social Studies Education Research, pp. 219-234, 2020.

[3] BPS Statistics, Indikator Kesejahteraan Rakyat, Jakarta: BPS Statistics Indonesia, 2023.

[4] A. O'Dubhslaine, "The White Paper on Education: a Failure to Invest," Student Economic Review, Vol 20, p. 115, 2006.

[5] D. C. Prasad, "Educational Impact on the Society," *Novelty Journals,* pp. 1-7, 2020, doi: 10.1729/Journal.36622 .

[6] G. Ragini, "Group Discussion," [Online]. Available: https://www.sastra.edu/nptel/download/Prof%20GPRagini/pdf_New/Unit%2026.pdf.

[7] L. Juliasari, "Whatsapp Juara Media Sosial Indonesia," 9 7 2024. [Online]. Available: https://www.rri.co.id/lain-lain/812616/whatsapp-juara-media-sosial-indonesia.

[8] Tiara, "Komparasi Usability ChatGPT vs Gemini AI Berdasarkaan ISO/IEC 9126 dan Nielsen Model Menggunakan Metode Usability Testing," Jurnal Sistem Informasi Musi Rawas, pp. 89-100, 2024, doi: 10.32767/jusim.v9i1.2285.

[9] M. Imran, "Google Gemini as a Next Generation AI Educational Tool: a Review of Emerging Educational Technology," Smart Learning Environments, pp. 11-22, 2024, doi: 10.1186/s40561-024-00310-z.

[10] A. A. Wahid, "Analisis Metode Waterfall Untuk Pengembangan Sistem Informasi," Jurnal Ilmu Ilmu Informatika dan Manajemen STMIK, pp. 1-5, 2020, doi : 10.52771/bangkitindonesia.v10i1.153 .

[11] Y. F. Achmad, "Pengujian Sistem Pendukung Keputusan Menggunakan Black Box Testing Studi Kasus E-Wisudawan di Institut Sains dan Teknologi Al-Kamal," Jurnal Ilmu Komputer Vol 5 Nomor 1 , pp. 42-51, 2020, doi : 10.47007/komp.v5i01.4615 .

[12] I. D. M. Widia, "Black Box Testing Menggunakan Boundary Value Analysis dan Equivalence Partitioning pada Aplikasi Pengadaan Bahan Baku Batik dengan Pendekatan Use Case," Jurnal Informatika Merdeka Pasuruan, vol. 6, no. 1, pp. 15-21, 2021, doi : 10.37438/jimp.v6i1.300 .

[13] J. Oranga, "Qualitative Research: Essence, Types, and Advantage," Open Access Library Journal, vol. 10, pp. 1-9, 2023, doi : 10.4236/oalib.1111001 .

[14] R. Suryana, "Pengembangan Kecerdasan Buataan Whatsapp Chatbot untuk Mahasiswa," Jurnal Teknologi Sistem Informasi dan Aplikasi, vol. 5, no. 1, pp. 37-46, 2022, doi : 10.24076/joism.2025v7i1.2098 .

[15] A. E. Suryanto, "Transformasi Pendidikan Melalui Penggunaan Chatbot: Manfaat, Tantangan, dan Rekomendasi untuk Masa Depan," Journal on Education, vol. 6, no. 3, pp. 20466-20477, 2024,doi: 10.31004/joe.v6i4.5989.

[16] F. H. Aldwinarta, "Media Pembelajaran Berbasis AI Chatbot pada Materi Termokimia di SMA Apakah Dibutuhkan," Jurnal Inovasi Pendidikan Kimia, vol. 18, no. 1, pp. 1-6, 2024, doi:10.15294/jipk.v18i1.49044.

[17] Sukiman, "Pelatihan Pemanfaatan Gemini AI untuk Mendukung Pembelajaran pada SMA di Sumatera Utara," Prioritas: Jurnal Pengabdian Kepada Masyarakat, pp. 75-80, 2024, doi: 10.31004/jerkin.v4i1.1762 .