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**Evaluating the Impact of the AI-Powered Interactive
Journal “I Am Great Because of Me” on Reducing
Impostor Syndrome Among High Performing Students**

评估基于人工智能的交互式日志“我因为自己而伟大”对减少
高绩效学生冒名顶替综合症的影响

INDONESIA

Evaluating the Impact of the AI-Powered Interactive Journal 'I Am Great Because of Me' on Reducing Impostor Syndrome Among Top High Performing Students

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ABSTRACT

Keywords

Interactive journal
Artificial intelligence
Impostor syndrome

Impostor Syndrome, a psychological phenomenon where individuals doubt their abilities despite evident achievements, can hinder personal and academic development. This study aims to evaluate the effectiveness of the interactive journal "*I am Great Because of Me*", integrated with artificial intelligence (AI), in addressing Impostor Syndrome among high-performing students. The journal features innovative tools such as the Clance Impostor Phenomenon Scale (CIPS) test accessible via QR code, self-acknowledgement pages, and virtual consultations powered by AI chatbots. These elements aim to support self-reflection, provide real-time diagnostics, and deliver actionable recommendations for users. The ADDIE model was employed for the journal's development, incorporating feedback from experts and users. Likert scales and Cohen's D analysis were used to evaluate satisfaction, usability, and impact. Results showed that 90.1% of students expressed high satisfaction with the journal's accessibility, interactivity, and capacity to enhance self-awareness and motivation. A pre-test and post-test conducted on the intervention group revealed a significant reduction in Impostor Syndrome by 42.5%, with an effect size of 2.84, categorized as "very large." Features such as the self-acknowledgement worksheets helped students recognize their strengths, while AI consultations offered additional psychological support. Expert validation emphasized the journal's clarity, relevance, and objectivity, noting the absence of bias in AI-driven suggestions. The journal was praised for its accurate content, ease of use, interactivity, and the protection of user data, ensuring a safe and private environment for self-development. Students found the journal beneficial not only for addressing Impostor Syndrome but also for fostering personal growth and self-confidence. This research demonstrates the potential of combining psychological theories with AI-driven tools in education. The journal "*I am Great Because of Me*" effectively aids students in overcoming Impostor Syndrome and improving self-perception. It serves as a scalable solution for schools and individuals aiming to tackle similar psychological challenges. Future studies are encouraged to explore its application in broader contexts to maximize its impact.

1. INTRODUCTION

Impostor Syndrome has been widely recognized in various media and literature as a mental health condition that can disrupt an individual's professional performance and lead to mental burnout (Bravata D. M. et al., 2019). Impostor Syndrome is defined as the belief that one's achievements or recognition are not the result of their hard work but merely due to luck (Feenstra S. et al., 2020). Impostor Syndrome was first introduced in the late 1970s by psychologists Clance and Ines as a phenomenon that occurs among high-achieving individuals who struggle to internalize their success (Chandra S. et al., 2019). Clance argued that Impostor Syndrome is not a "pathological disease that inherently harms or damages oneself" but can significantly disrupt an individual's psychological well-being.

In recent years, mental health has been a significant global issue (Nazira D. et al., 2022). Data from the 2018 Basic Health Research survey revealed that adolescents aged 15–24 years are already at risk of experiencing mental health disorders. One of the factors affecting adolescents' mental health is the pressure related to academic life (Nurhaeni A. et al., 2022). While academic pressure can have positive impacts, such as enhancing creativity and personal growth when kept within manageable limits, it can also lead to negative effects. These include long-term memory issues, difficulty concentrating, problem-solving challenges, and impaired academic performance (Rahmawati S. et al., 2017). Such conditions can also trigger Impostor Syndrome.

A study published in the *International Journal of Behavioural Science* reported that an average of 70% of the global population has experienced Impostor Syndrome at some point (Fandrayani A. et al., 2021). Research has shown that Impostor Syndrome is particularly common among individuals whose families place a high emphasis on intelligence and achievement. Additionally, factors such as a lack of social support from family, poor communication patterns, and excessive control by family members contribute to 12% of Impostor Syndrome cases in individuals (Nabila et al., 2022). This is a critical issue, as it can result in anxiety, depression, mental burnout, physical exhaustion, avoidance of important tasks, and rejection of positive feedback.

Given these impacts, Impostor Syndrome can significantly disrupt an individual's life. One approach to addressing Impostor Syndrome is through the use of interactive journals designed to help individuals manage their feelings of self-doubt. Researchers chose an interactive journal because it engages readers, encouraging them to actively participate in the content (Asela S. et al., 2020). Interactive journals have been shown to help adolescents express their feelings through writing, providing a private and personal space for them to freely explore their emotions (Sabil R. & Karnita R., 2022). The positive effects of interactive journals for managing feelings of insecurity are comparable to their effects on providing realistic self-assessment and instilling positive impressions by fostering strong relationships with mentors and peers.

The emergence of artificial intelligence (AI) has transformed global perspectives. Researchers chose AI-based guidance because it offers supportive and encouraging assistance, helping individuals recognize that feeling like an "impostor" is not uncommon but can have harmful effects if left unaddressed. In general, AI techniques are effective and accessible as long as technology is available. We chose high-performing students as the sample for this study because they are often more prone to experiencing Impostor Syndrome due to the high expectations placed upon them, both internally and externally. These students frequently excel in their academic and extracurricular pursuits, yet they may struggle with self-doubt and feel undeserving of their achievements. Specifically, these techniques can help high performing students with low self-esteem embrace their feelings of being an impostor and incorporate them as part of their success (Chandra S. et al., 2019).

Although extensive research has been conducted on Impostor Syndrome, studies linking it to high-achieving students remain rare. This prompted researchers to test the effectiveness of an

interactive journal titled *"I Am Great Because of Me"* powered by artificial intelligence, aiming to help high performing students to cope with Impostor Syndrome. The journal contains positive affirmations and self-validation exercises to build students' confidence in their achievements and honors. The advantage of this research compared to previous studies is the use of an interactive journal with an AI system, making it easier for adolescents to manage their Impostor Syndrome.

1.1 Impostor Syndrome

1.1.1 Definition

According to Clance and Ines (1978), Impostor Syndrome is an internal experience in which individuals feel that they are unworthy and lack potential, even though they actually have potential and belong to the group of high achievers (Indira L. & Ayu M., 2021). People with Impostor Syndrome struggle to accurately assess their performance in relation to their actual competence (e.g., attributing success to external factors such as luck or help from others, while viewing failures as evidence of professional inadequacy) (Bravata M.D. et al., 2020).

1.1.2 Causes

Research has revealed that Impostor Syndrome is more likely to occur in individuals whose families emphasize the importance of intelligence and achievement. Additionally, a lack of social support from family, poor communication patterns, and excessive control by family members contribute to 12% of Impostor Phenomenon cases in individuals (Nabila et al., 2022). Impostor Syndrome is also common among new students due to factors such as unfamiliarity with their new roles, competition among peers, and other pressures frequently encountered in academic cultures (Ati E.T. et al., 2015).

1.1.3 Impacts

Feelings associated with Impostor Syndrome can hinder the academic development of high-achieving but underrepresented minorities by causing them to withdraw from their academic efforts (e.g., skipping classes, limiting campus activities), avoiding evaluative situations, experiencing persistent feelings of inadequacy, and displaying unhealthy pressure to succeed. These individuals also report increased test anxiety, reduced confidence in their intelligence, and negative psychological outcomes such as depression (Joshi A. & Mangette H., 2018).

1.2 Interactive Journals

Interactive books are a type of book that not only can be read or written in but also interact with the reader, encouraging their participation in the book (Asela S. et al., 2020). According to the Oxford Dictionary, "interactive" refers to involves people working together and having an influence on each other. Interactive books are also considered media that provide information while training children's cognitive and motor skills in character education, serving as both reading material and a medium for play (Indrayana M. L. et al., 2018).

1.3 Artificial Intelligence

1.3.1 Definition

Artificial intelligence (AI) is one of the oldest and broadest fields of computer science, encompassing all aspects of mimicking cognitive functions to solve real-world problems and building systems that learn and think like humans (Holzinger A. et al., 2018). AI provides insights into complementary or alternative questions and defines the boundary between human and machine performance in cognitive tasks (Agrawal A. et al., 2019).

1.3.2 Forms

AI is integrated into our daily lives in various forms, such as personal assistants (Siri, Alexa, Google Assistant, etc.), automated mass transportation, aviation, and computer games. Recently, AI has also been incorporated into the medical field to enhance patient care by accelerating processes and achieving greater accuracy, thereby paving the way for improved healthcare services overall. AI can also be used to provide online customer assistance that surpasses traditional personalized recommendation systems. A notable example is the deployment of digital assistants, which may eventually replace sales personnel in certain activities, such as managing online customer relationships (Pizzi G. et al., 2021).

1.3.3 Impacts

Integrating human resource management processes with artificial intelligence can generate additional positive impacts for organizations, such as improved managerial decision-making, faster and more effective recruitment processes, enhanced workplace learning, increased employee engagement, and better employee retention (Pereira V. et al., 2023). However, according to Velibor Božić (2023), there are several negative impacts of artificial intelligence, including:

- Bias
- Lack of transparency
- Unemployment
- Malicious use
- Dependence

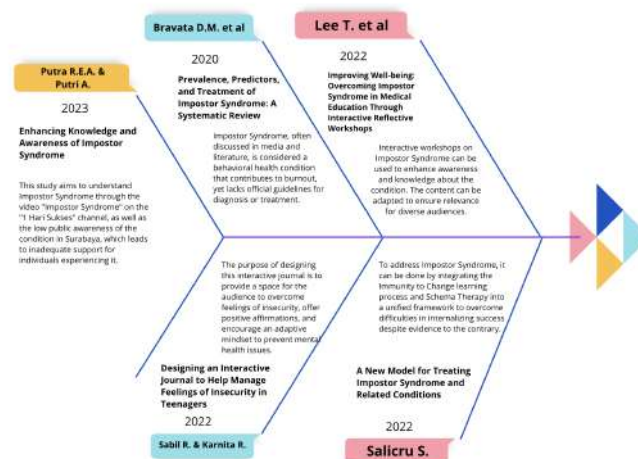


Figure 1. Fishbone of Previous Researches

2. RESEARCH METHOD

2.1 Time and Place of Research

This research will be conducted from July 10, 2024, to September 7, 2024. The creation and development of the AI-powered interactive journal "*I am Great Because of Me*" will take place from July 15 to August 10, 2024. Effectiveness testing, satisfaction surveys, and feasibility assessments will be carried out from August 11 to September 7, 2024. This research is being conducted at SMA Negeri Unggulan M.H. Thamrin.

2.2 The ADDIE Method

This research employs the ADDIE instructional method, a dynamic research process comprising five stages: analysis, design, development, implementation, and evaluation (Cahyadi R. A. H., 2019), as illustrated by the following flow:

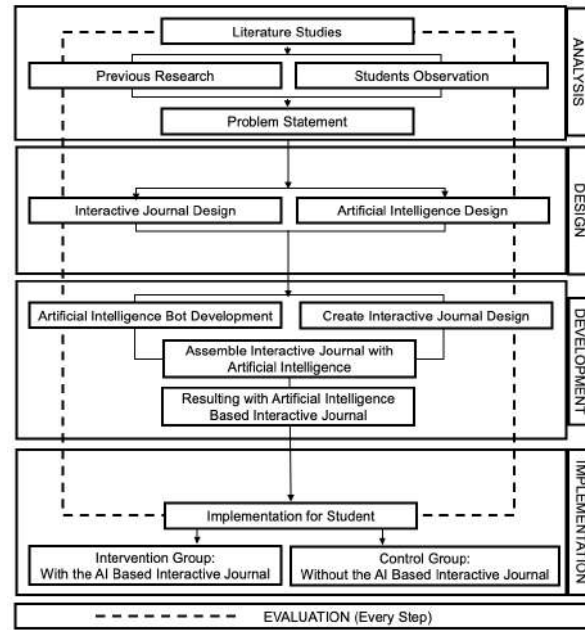


Figure 2. ADDIE Table

2.2.1 Analysis

SMA Negeri Unggulan M.H. Thamrin is one of the best high schools in Indonesia, filled with high-performing students. Unlike other public schools, SMA Negeri Unggulan M.H. Thamrin has unique admission requirements, including academic tests, psychological assessments, and interviews with the minimum requirement of 120 IQ. However, the researcher observed that many students at SMA Negeri Unggulan M.H. Thamrin feels undeserving of their achievements and believes their success is merely due to luck rather than their own abilities or efforts. This phenomenon was analyzed as a sign of Impostor Syndrome. Since many, if not most, high performing students experience these feelings, the researcher aims to create a solution by developing the AI-powered interactive journal "*I am Great Because of Me*", which is easily accessible, and testing its effectiveness in reducing signs of Impostor Syndrome.

2.2.2 Design

The AI-powered interactive journal "*I am Great Because of Me*" will be designed with a simple yet engaging concept to attract users. The journal will be available in both electronic and physical book formats. The physical book will consist of 12 pages containing the components outlined in the following flowchart:

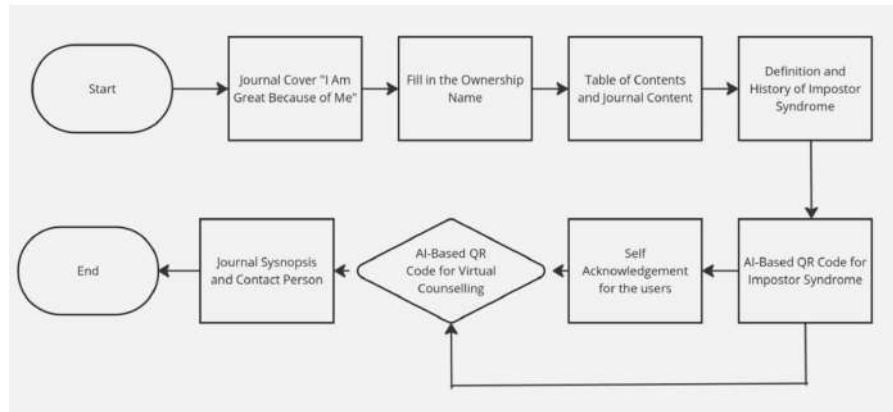


Figure 3. Flowchart of “*I am Great Because of Me*” Interactive Journal

A QR code included in the journal will direct users to an AI-powered platform where they can take an Impostor Syndrome test. The results will be provided instantly, alongside virtual counseling for further inquiries and discussions related to Impostor Syndrome. The self-acknowledgement page will prompt users to record their strengths or achievements, the efforts made to attain them, challenges faced both technically and mentally, and their aspirations. This process is intended to help users reflect on their abilities and appreciate themselves better, thereby mitigating Impostor Syndrome.

2.2.3 Development

The innovation proposed by the researcher to address Impostor Syndrome involves the AI-powered interactive journal “*I am Great Because of Me.*” The development method for the AI platform will utilize a chatbot created with the Botpress platform, incorporating prompts based on various journals related to Impostor Syndrome (Appendix 3). The AI chatbot will be interactive, capable of collecting real-time data, and addressing questions related to Impostor Syndrome. Once the chatbot’s flow and logic are fully developed, its link will be converted into a QR code. This QR code will be embedded in the journal, designed using Canva. The journal will be available in both printed form, made from writable paper, and digital format. After completion, the journal will be published and distributed to respondents for testing and data collection.

2.2.4 Implementation

The researcher will distribute the AI-powered interactive journal “*I am Great Because of Me*” to students at SMA Negeri Unggulan M.H. Thamrin, divided into two groups: intervention and control. The intervention group will undergo an Impostor Syndrome test both before (pre-test) and after (post-test) using the journal. The control group will follow the same procedure but will not receive the journal. After the intervention group uses the journal, the researcher will distribute a questionnaire to measure student satisfaction with the journal, using a rating scale ranging from “excellent” to “very poor.”

2.2.5 Evaluation

During the evaluation phase, the researcher will record any challenges encountered in the creation, use, and effectiveness testing of the AI-powered interactive journal “*I am Great Because of Me.*” Solutions will be proposed to prevent such challenges in future

implementations. Additionally, feedback from users will be collected, reviewed, and incorporated to further develop and enhance the journal's effectiveness.

2.3 Data Collection Methods

2.3.1 Respondent Criteria and Sampling Technique

The respondents are high performing students with exceptional achievements and with an IQ above 120, in this case the students of SMA Negeri Unggulan M.H. Thamrin, one of the best high schools in Indonesia which students have been through a competitive selection process. The reason for purposive sampling is the better matching of the sample to the aims and objectives of the research, thus improving the rigour of the study and trustworthiness of the data and results (Campbell S., et al., 2016). The sample size will be determined using Slovin's formula (Hamdi & Bahrudin, 2014):

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

Details:

n = Sample size

N = Total population (261 students)

e = Margin of error (acceptable level of inaccuracy = 0.05)

$$n = \frac{261}{1+261(0.05^2)}$$

$$n = 157.9425113 = 158$$

Thus, the total sample size is 158 students, divided equally into two groups: 79 students in the first group and 79 students in the second group.

2.3.2 Instrument Grid

To test the effectiveness of the "*I am Great Because of Me*" journal, the researcher will distribute two types of questionnaires. The first includes a satisfaction questionnaire for users (Appendix 1) and a feasibility questionnaire for experts (Appendix 2) to assess the satisfaction and feasibility of the journal. The second involves pre-test and post-test questionnaires adapted from the Clance Impostor Phenomenon Scale (CIPS), which has been validated as a tool to measure levels of Impostor Syndrome (Sahin E.E. & Gulsen F.U., 2022). This questionnaire uses a rating scale from 1 (very poor) to 5 (very good).

2.4 Data Processing and Analysis Methods

Data processing and analysis in this study will be based on Likert scale analysis to measure user satisfaction and Cohen's D analysis to assess the journal's effectiveness. Cohen's D is used for data validation by media experts to determine the validity of the AI-powered "*I am Great Because of Me*" journal. Effectiveness measurement will also employ ANCOVA to test differences between pre-test and post-test scores of the intervention and control groups in addressing Impostor Syndrome. The effect size or effectiveness will be calculated using Cohen's D formula (Lovakov & Agadullina, 2021):

$$D = \frac{M_1 - M_2}{Sp} \quad \dots(2)$$

The descriptions $M1$ and $M2$ represent the mean scores of the samples for the intervention and control groups, D denotes the effect size, and Sp represents the pooled estimate of the population standard deviation (Wilson, 2022). The formula for Sp is as follows:

$$Sp = \sqrt{\frac{(n_1-1)sd_1^2 + (n_2-1)sd_2^2}{n_1 + n_2 - 2}} \quad \dots\dots(3)$$

The Cohen's D formula results will be interpreted based on the following table:

Table 1. Cohen's D Effect Size Interval

Effect Size	Description
$0.00 < D < 0.20$	Ignored
$0.20 < D < 0.50$	Small
$0.50 < D < 0.80$	Moderate
$0.80 < D < 1.30$	Large
$1.30 < D$	Very Large

To assess feasibility, the researcher will use a Likert scale, which is a measurement tool consisting of multiple questions combined into a single score to describe individual characteristics such as knowledge, attitudes, and behavior. Respondents will rate statements on a scale of 1 to 5, where 1 indicates strong disagreement, and 5 indicates strong agreement. Collected data will be analyzed using appropriate statistical techniques to provide in-depth insights into the phenomenon under investigation and form the basis for research conclusions and recommendations (Syofian S., et al., 2015).

Table 2. Likert Scale Rating Interval

Likert Scale Rating Interval	Percentage Range (%)
Not satisfied	0% - 59,99%
Satisfied	60% - 79,99%
Very satisfied	80% - 100%

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Development Results

The development was conducted by the researcher with the aim of enabling direct interaction with users through an interactive system, along with an Impostor Syndrome diagnostic test and consultation from artificial intelligence with real-time data results. To create the Artificial Intelligence (AI), several workflows were required, starting from the development phase of the workflow, where the main workflow governs the logic of the chatbot (Figure 4). This flow begins with the first page, which includes language settings, greetings, data collection of name, gender, age, and residence. Afterward, users are given the option to take the Impostor Syndrome diagnostic test or proceed to virtual counseling.

The Impostor Syndrome diagnostic test begins with an introduction, then the system will present several questions related to Impostor Syndrome with yes or no

answers based on the Clance Impostor Phenomenon Scale (CIPS). After completing the test, users are directed to a virtual counseling page with prompts through several journals related to Impostor Syndrome. After all processes are completed, the system will end the conversation by closing the session. To view the user's data, a data table is created according to the research needs to store and manage information from the workflow. The layout of the AI chatbot is shown in the following figure. Once the artificial intelligence has been formed, it will be converted into a QR code.

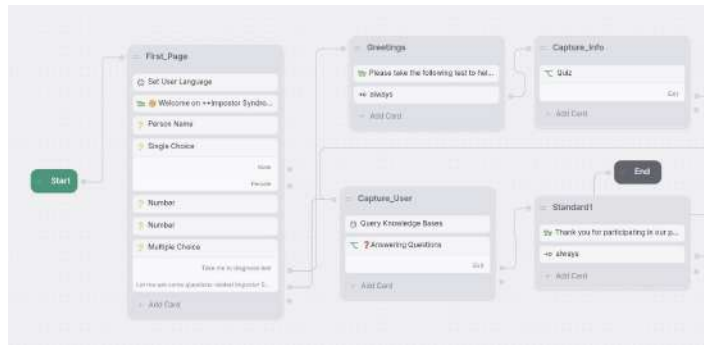


Figure 4. Main Workflow

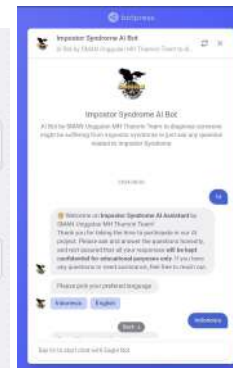


Figure 5. AI Layout

To increase engagement, interactivity, and easier, portable access, an interactive journal was created to guide users to use the artificial intelligence-based chatbot. The design of the "*I am Great Because of Me*" interactive journal was created using the Canva platform, producing the following designs:

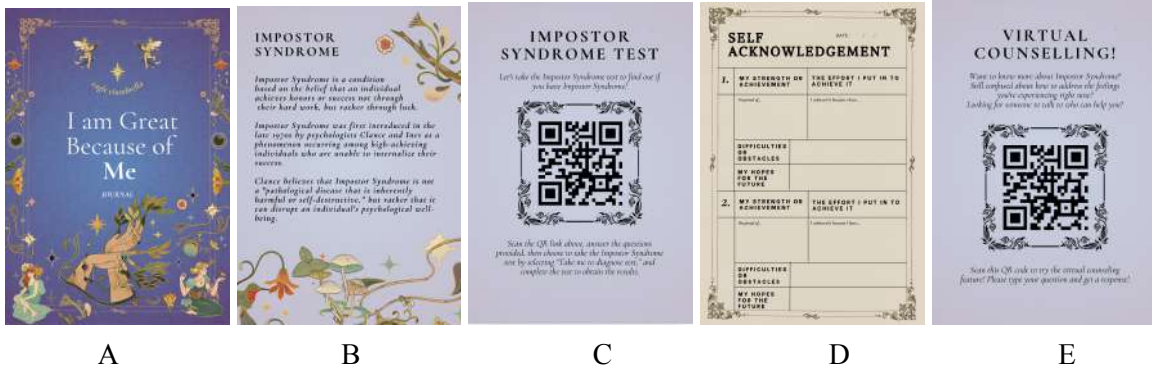


Figure 6. Journal Designs

These designs represent the main components of the "*I am Great Because of Me*" interactive journal based on artificial intelligence. Figure 6A is the cover of the journal, which includes the title and the names of the researchers. Figure 6B provides the definition and a brief history of Impostor Syndrome. Figure 6C shows the QR code for artificial intelligence with instructions to take the Impostor Syndrome test. Figure D is the self-acknowledgement page, which includes achievements or strengths, efforts made, challenges or obstacles faced, and the user's future expectations. The last page, Figure 6E, contains the QR code for artificial intelligence and instructions for virtual counseling, where users can ask and consult with the AI about Impostor Syndrome. After the design is made, it can be downloaded as a digital book or printed on A4 or B5

paper size, then distributed to respondents, the students of SMAN Unggulan M.H. Thamrin.

3.1.2 Satisfaction and Feasibility Results

After using the "*I am Great Because of Me*" interactive journal, 79 students from the intervention group filled out a satisfaction questionnaire (Appendix 7), and 3 experts filled out a feasibility questionnaire (Appendix 8) with the following results:

Table 3. Satisfaction Test Results by Students

Likert Scale Rating Interval	Percentage in (%)	Number of Students
Not satisfied	0% - 59,99%	0
Satisfied	60% - 79,99%	9
Very satisfied	80% - 100%	70
Average		90,1 %

Table 4. Feasibility Test Results by Experts

Feasibility Questionnaire Respondent	Percentage in (%)	Likert Scale Rating Interval
Expert 1	93,5%	Very satisfied
Expert 2	91,25%	Very satisfied
Expert 3	88,75%	Very satisfied
Average		91,25%

With an average satisfaction rating of 90.1%, the journal falls into the "very satisfied" category. Considering the expert feasibility data at 91.25%, the journal is categorized as "feasible" based on the Likert scale rating interval (Table 2). Therefore, the "*I am Great Because of Me*" interactive journal based on artificial intelligence shows high satisfaction and feasibility from both users and experts.

3.1.3 Effectiveness Test Results

The effectiveness of the "*I am Great Because of Me*" interactive journal based on artificial intelligence was measured using pre-tests and post-tests with 158 students, 79 in the intervention group (Appendix 5) and 79 in the control group (Appendix 6), with a questionnaire containing an Impostor Syndrome test based on the Clance Impostor Phenomenon Scale (CIPS). The results of both groups are as follows:

Tabel 5. Data from the Intervention and Control Group

Group	Average (Impostor Syndrome Level in %)	Standard Deviation	Number of Students in Group
Control Group	74,30	16,15	79
Intervention Group	31,80	13,53	79

After obtaining the average data, standard deviation, and number of students, to measure the effectiveness of the "*I am Great Because of Me*" interactive journal based on

artificial intelligence, the researcher used D'Cohen analysis from equation 2 by first calculating Sp from equation 3 and obtained the following result:

$$Sp = \sqrt{\frac{(79-1)16,15^2 + (79-1)13,53^2}{79+79-2}} = 14,94$$

$$D = \frac{74,30 - 31,80}{14,94} = 2.84$$

Based on the D'Cohen rating interval (Table 1), with an effect size (D) of 2.84, this indicates a "very large" effect size. This shows a significant difference between the intervention and control groups, indicating that the *"I am Great Because of Me"* interactive journal based on artificial intelligence is highly effective in addressing Impostor Syndrome in high performing students.

3.2 Discussion

Based on the data analysis from the research conducted on 158 students at SMA Negeri Unggulan M.H. Thamrin, the researcher found that the use of the interactive journal *"I am Great Because of Me"* based on artificial intelligence has a significant impact on reducing the Impostor Syndrome score index. Previous research has provided a solid foundation for understanding the use of interactive journals, especially in aspects related to personal development. For example, a study by Sabil R. and Karnita R. (2022) found that interactive journals could help manage feelings of insecurity among adolescents. This finding is crucial as it serves as a basis for the researcher to create an interactive journal according to its guidelines.

However, the previous research had some limitations, including the lack of effectiveness in collecting real-time data, which could affect the validity or generalizability of the results. In contrast, this study introduces several innovations in methodology, such as using an artificial intelligence chatbot to assess respondents' Impostor Syndrome. This allows for more accurate, easy, and relevant data collection in real-time.

Additionally, the development of methods and data analysis in this study shows differences, including the use of Likert scale to measure user satisfaction and feasibility by experts, as well as D'Cohen analysis to measure effectiveness. This is different from previous studies, which only used qualitative data as the method and data analysis. Therefore, this study contributes new insights into understanding Impostor Syndrome, which not only strengthens previous findings but also offers a new perspective that is more relevant to current conditions.

This research developed an interactive journal based on artificial intelligence with the aim of providing a diagnostic test for Impostor Syndrome, virtual counseling for users, as well as a space for introspection and self-appreciation on a regular basis, which can have a lasting effect. This innovation uses workflows designed to guide users through structured interactions. The workflow used includes main workflow, error workflow, timeout workflow, and custom workflow for the Impostor Syndrome test. The main workflow starts with a first page containing language settings and personal data collection (name, gender, age, residence). Afterward, users are given the choice to take the Impostor Syndrome test, based

on the Clance Impostor Phenomenon Scale (CIPS), or opt for virtual counseling, which is equipped with references to journals related to Impostor Syndrome. The data collected from these interactions are stored in a table for further analysis. The results of this test could show a low, moderate, or high likelihood of Impostor Syndrome. The Impostor Syndrome test is linked to a custom workflow that includes 20 questions connected to each other. Then, in the virtual counseling section, the AI chatbot is linked to prompts consisting of journals related to Impostor Syndrome.

Once the artificial intelligence system is formed, it is converted into a QR code format for easier access by users, thereby improving interaction ease. This development is also complemented with the interactive journal "I am Great Because of Me," which was designed using the Canva platform. The journal is divided into several key elements that support the overall objective, as explained through images 6A to 6E:

- a) **Image 6A** shows the attractive cover of the journal, which aims to motivate users from the start to actively participate. The cover design is tailored to look modern and relevant for teenagers, the main target users of this journal.
- b) **Image 6B** contains the definition of Impostor Syndrome to provide users with more insight into this condition. This section's goal is to help users understand the symptoms and negative impacts of Impostor Syndrome, as well as the importance of filling out this journal to recognize and address the syndrome in themselves.
- c) **Image 6C** displays the QR code linked to the artificial intelligence system. Through this QR code, users can quickly access the Impostor Syndrome diagnostic test in real-time. This test helps raise self-awareness and encourages users to introspect on the level of Impostor Syndrome they experience based on the results obtained.
- d) **Image 6D** directs users to fill out the self-acknowledgement sheet. This sheet includes columns for users to note their achievements, strengths, obstacles, and future hopes. The goal is to help users realize that their achievements are not just due to luck but are the results of their hard work. This sheet can also be filled out regularly whenever users reach new achievements, making the journal a tool for continuous self-appreciation.
- e) **Image 6E** shows the final page, which directs users to the virtual counseling session with artificial intelligence. This counseling allows users to ask further questions related to Impostor Syndrome or consult personally. This feature makes it easy for users to get psychological support whenever they need it, in an easily accessible manner.

This journal can be accessed in both digital and physical formats and is intended for students at SMA Negeri Unggulan M.H. Thamrin as the target respondents.

In terms of user satisfaction, the test results on 79 students (the experimental group) showed that 90.1% were very satisfied with this journal. Some factors contributing to the students' high satisfaction include ease of use, interactivity, the quality of the information provided, and the journal's ability to improve self-understanding and motivation for personal development. On the other hand, three experts were also asked to fill out a feasibility questionnaire, which resulted in an average of 91.25% feasibility, categorized as very satisfied, and concluded with recommendations to continue the research after revisions, generally focusing on the workflow and bugs in the artificial intelligence system.

In terms of effectiveness, a pre-test and post-test were conducted on two groups of students (intervention and control groups) with a total of 158 students. The results showed that the intervention group experienced a significant decrease in Impostor Syndrome levels, with an Impostor Syndrome index of 74.30% in the control group and 31.80% in the intervention group, indicating a 42.5% decrease in Impostor Syndrome across both groups. A higher percentage indicates a higher Impostor Syndrome index, while a smaller percentage indicates

a lower index. The D'Cohen analysis showed an effect size of 2.84, categorized as "very large."

Several factors contributed to this decrease in Impostor Syndrome index, such as many students gaining a better understanding of what Impostor Syndrome is and its impacts. The diagnostic test triggered deep self-introspection, and features like the self-acknowledgement sheet help users recognize the achievements and efforts they had made. Although some students needed time to fill out the sheet, they eventually realized their achievements and strengths, which they had previously overlooked. Virtual counseling also helped expand their understanding of how to better handle Impostor Syndrome and could be easily accessed anytime and anywhere.

Thus, the results of this study show that the interactive journal based on artificial intelligence is effective in reducing Impostor Syndrome symptoms among students and has great potential for wider use. Areas that can be improved and further developed in this study include:

1. The complexity of the algorithm and interaction between artificial intelligence components, which sometimes causes bugs that lead to errors in data analysis, reducing overall performance.
2. The inconsistency in the workflow followed by users during the stages, which causes the data to become unstructured and difficult to process. The main cause is that the artificial intelligence chatbot provides two main features: the Impostor Syndrome diagnostic test and virtual counseling. Ideally, virtual counseling should be conducted after the user fills out the self-acknowledgment sheet, but many users try the virtual counseling first out of curiosity. Nevertheless, data analysis shows that the difference in the order of filling out the tasks does not significantly affect the overall results, even though the filling order was different.

Overall, this research successfully developed an innovative solution in the form of the interactive journal "I am Great Because of Me" based on artificial intelligence, which is not only interactive and easily accessible but also effective in combating Impostor Syndrome among students. The high satisfaction from users and good feasibility from experts show that this journal has great potential for broader adoption in other educational institutions.

4. CONCLUSIONS

Based on the results of the analysis conducted using ADDIE, D'Cohen analysis, and the Likert scale as tools to analyze the data obtained, the researcher can conclude several points, namely:

1. The development of this journal involves the introduction of innovative features such as the Clance Impostor Phenomenon Scale (CIPS) test, the self-acknowledgment sheet, and virtual counseling, all accessible via a QR code. The artificial intelligence chatbot helps collect real-time data and provides diagnostic tests and counseling sessions that are easily accessible at any time. Users appreciate the ease of access, interactivity, and the journal's ability to aid self-introspection. Survey results show that 90.1% of students are very satisfied with the journal, particularly because of its ability to improve self-understanding and motivation for personal development.
 2. The pre-test and post-test conducted on the intervention group showed a 42.5% decrease in the Impostor Syndrome index, with an effect size of 2.84, which falls under the "very large" category. Features such as the self-acknowledgement sheet helped students recognize their achievements, while virtual counseling provided additional support. This research is highly effective in addressing Impostor Syndrome.
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AUTHOR'S BIOGRAPHY

	Talita Almira Salsabila, known as Talita, was born in Jakarta on August 15, 2008. She is currently an 11th-grade student at SMA Negeri Unggulan M.H. Thamrin, one of the top schools in Indonesia. Talita is known for her skills and strong interest in leadership, advocacy, organization, as well as research and academics. Talita has a deep interest in the social situations and psychological phenomena around her, which drives her to participate in various competitions and research projects. Talita's goal is to contribute to society by engaging in research and advocating for issues faced by Indonesia and the world to create a positive impact and achieve Indonesia's golden era.
	Adelia Nasywa Ramadhani, or Adelia, was born in Jakarta on September 14, 2008. She is currently an 11th-grade student at SMA Negeri Unggulan M.H. Thamrin, one of the top schools in Indonesia. Known for her passion for research and academic dedication, Adelia has shown a great interest in understanding the world since she was young. Her curiosity drives her to excel in her studies and actively participate in various research projects. Adelia aims to contribute to the advancement of knowledge and make a positive impact on society through her skills and education.

APPENDIX

Appendix 1. Student Satisfaction Instrument

No.	Questions	1	2	3	4	5
1.	How easy was it for you to navigate and use the features available in the interactive journal “I am Great Because of Me”?					
2.	How informative did you find the brief explanation provided about Impostor Syndrome in this journal?					
3.	To what extent did you feel that the Impostor Syndrome test accessed via the QR code provided a better understanding of yourself?					
4.	How helpful was it for you to discover and acknowledge your strengths after using this journal?					
5.	Did you feel that the information provided about the things you like about yourself helped increase your self-confidence?					
6.	To what extent did you feel motivated to make more efforts to achieve good things in life after using this journal?					
7.	What is your opinion on the ease of resolving and modifying any technical difficulties encountered through this journal?					
8.	To what extent did you feel supported in dealing with psychological or mental difficulties after using the interactive features provided in the journal?					
9.	Did you feel interested in learning more about Impostor Syndrome through the artificial intelligence link available in this journal?					
10.	How likely are you to recommend the interactive journal “I am Great Because of Me” to a friend or peer who may also experience Impostor Syndrome?					

Appendix 2. Expert Satisfaction Instrument

Aspects	Indicators
Clarity	The purpose of this interactive journal is clear and easy to understand.
	The instructions for using and navigating the journal are easy to comprehend.
Content Accuracy	The content presented in this journal supports the personal development of students.
	The suggestions and recommendations from the AI are relevant and aligned with the goals.
Relevance	The content of this journal is relevant to the topic of Impostor Syndrome and personal development.
Content Validity	The information provided in this journal is accurate and trustworthy.
	The AI in this journal provides analysis based on the data given by the user.

No Bias	The AI system is free from bias and offers objective suggestions based on the user's needs.
Interactivity	The interactive features of this journal are easy to use and not confusing.
	Interactions with the AI in this journal actively engage the user.
Usefulness	This journal provides tangible benefits in improving oneself and addressing the user's Impostor Syndrome.
	The recommendations from the AI can be easily applied in the user's daily life.
Security and Privacy	The user's personal data is well-protected in this journal.
	The privacy policy regarding the use of user data is clearly explained.
Evaluation and Feedback	The evaluations generated from this journal are clear and helpful for the user.
	The feedback from the AI is beneficial for the user's development.

Appendix 3. Prompts for the AI Chatbot

The prompts that serve as consultations play an important role in determining how the AI responds to the user's needs. The following prompts are used for this AI:

1. Predicting Young Impostor Syndrome Using Ensemble Learning (2022) Khan M.N.A. et al.
2. Contextualizing the Impostor Syndrome (2020) Feenstra S., et al.
3. Prevalence, Predictors, and Treatment of Impostor Syndrome: A Systematic Review (2019) Bravata D.M., et al.
4. Impostor Syndrome, a Reparative History (2016) Simmons D.

Appendix 4. Table of the intervention group

Appendix 5. Table of the control group

INTERVENTION GROUP				CONTROL GROUP			
PRETEST		POST TEST		PRETEST		POST TEST	
70	Moderate	35	Low	38	Low	38	Low
74	Moderate	42	moderate	94	High	92	High
72	Moderate	80	High	86	High	86	High
70	Moderate	14	Low	70	Moderate	72	Moderate
82	High	38	Low	70	Moderate	68	Moderate
70	Moderate	14	Low	74	Moderate	74	Moderate
28	Low	24	Low	36	Low	36	Low
68	Moderate	8	Low	72	Moderate	76	Moderate
88	High	30	Low	80	High	72	Moderate
86	High	28	Low	74	Moderate	74	Moderate
90	High	26	Low	68	Moderate	68	Moderate
82	High	18	Low	92	High	90	High
72	Moderate	16	Low	92	High	92	High
70	Moderate	30	Low	34	Low	34	Low
82	High	44	Moderate	70	Moderate	72	Moderate
70	Moderate	44	Moderate	94	High	94	High

92	High	28	Low	98	High	98	High
64	Moderate	32	Low	42	Moderate	40	Low
64	Moderate	42	Moderate	72	Moderate	74	Moderate
94	High	16	Low	88	High	88	High
62	Moderate	10	Low	92	High	92	High
94	High	16	Low	66	Moderate	66	Moderate
94	High	16	Low	64	Moderate	66	Moderate
90	High	42	Moderate	88	High	92	High
38	Low	36	Low	92	High	92	High
68	Moderate	32	Low	70	Moderate	72	Moderate
90	High	20	Low	88	High	88	High
94	High	46	Moderate	88	High	86	High
64	Moderate	26	Low	68	Moderate	68	Moderate
92	High	40	Low	32	Low	32	Low
40	Low	50	Moderate	46	Moderate	40	Low
72	Moderate	44	Moderate	92	High	92	High
90	High	34	Low	66	Moderate	70	Moderate
94	High	42	Moderate	72	Moderate	70	Moderate
84	High	26	Low	78	Moderate	78	Moderate
86	High	44	Moderate	40	Low	42	Moderate
92	High	16	Low	36	Low	36	Low
64	Moderate	14	Low	90	High	92	High
90	High	36	Low	70	Moderate	70	Moderate
94	High	14	Low	92	High	92	High
40	Low	24	Low	94	High	94	High
84	High	34	Low	80	High	86	High
90	High	20	Low	86	High	86	High
64	Moderate	18	Low	74	Moderate	74	Moderate
100	High	58	Moderate	42	Moderate	40	Low
44	Moderate	34	Low	68	Moderate	70	Moderate
92	High	32	Low	90	High	90	High
94	High	42	Moderate	36	Low	36	Low
94	High	52	Moderate	60	Moderate	64	Moderate
70	Moderate	26	Low	68	Moderate	68	Moderate
72	Moderate	44	Moderate	68	Moderate	68	Moderate
40	Low	28	Low	70	Moderate	70	Moderate
94	High	66	Moderate	90	High	94	High
92	High	30	Low	72	Moderate	72	Moderate
96	High	22	Low	96	High	96	High
96	High	16	Low	66	Moderate	66	Moderate

92	High	24	Low	62	Moderate	62	Moderate
90	High	25	Low	86	High	86	High
38	Low	16	Low	84	High	82	High
72	Moderate	42	Low	80	High	80	High
76	Moderate	32	Low	72	Moderate	72	Moderate
74	Moderate	16	Low	70	Moderate	70	Moderate
90	High	18	Low	72	Moderate	70	Moderate
90	High	54	Moderate	90	High	92	High
74	Moderate	14	Low	76	Moderate	74	Moderate
94	High	30	Low	70	Moderate	72	Moderate
84	Moderate	32	Low	80	Moderate	70	Moderate
44	Moderate	26	Low	94	High	94	High
86	High	38	Low	90	High	92	High
82	High	44	Moderate	74	Moderate	74	Moderate
56	Moderate	36	Low	72	Moderate	72	Moderate
36	Low	26	Low	90	High	90	High
84	High	52	Moderate	92	High	90	High
82	High	40	Low	70	Moderate	64	Moderate
96	High	38	Low	40	Moderate	52	Moderate
92	High	44	Moderate	92	High	92	High
78	Moderate	26	Low	80	High	90	High
82	High	44	Moderate	76	Moderate	76	Moderate
86	High	36	Low	98	High	98	High

Appendix 6. Table of Satisfaction Test Results by Students

SATISFACTION TEST			
100	Very Satisfied	82	Very Satisfied
88	Very Satisfied	98	Very Satisfied
100	Very Satisfied	84	Very Satisfied
76	Satisfied	76	Satisfied
94	Very Satisfied	78	Satisfied
82	Very Satisfied	94	Very Satisfied
94	Very Satisfied	100	Very Satisfied
84	Very Satisfied	94	Very Satisfied
94	Very Satisfied	76	Satisfied
92	Very Satisfied	94	Very Satisfied
86	Very Satisfied	88	Very Satisfied
86	Very Satisfied	94	Very Satisfied
100	Very Satisfied	90	Very Satisfied
92	Very Satisfied	100	Very Satisfied
78	Satisfied	88	Very Satisfied
84	Very Satisfied	100	Very Satisfied


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【評語】 130014

This project aims to evaluate the effectiveness of receiving the AI-powered interactive journal 'I Am Great Because of Me' on reducing the impostor syndrome among high performing high-school students. The topic is rooted from the authors' life experience and is adequately justified by the literature. The following questions and comments may help the authors to improve the project further.

1. How were students assigned into the intervention group and the control group? Were any measures taken to ensure that these two groups of students were comparable before the experiment? Any demographic information (e.g., gender, school grades) was recorded in the questionnaire?
2. What was the reason to have both the electronic and physical formats of the interactive journal? Would the physical book format still enable the interactive function/feature of the design as well as the electronic book format? It is recommended to analyze the data according to the time that individual participants accessed the electronic book.
3. Although the raw data of individual students were provided in the appendix, the summary of the results, particularly the

scores of the pre-test and the post-test should be provided in the main text of the report.

4. An adequate statistical test (i.e., the t-test) should be employed to evaluate the significance of the results.
5. Given that the project has been conducted, the writing of the report should be in the past tense rather than in the future tense. Moreover, the appendices should be numbered according to the order of their appearances in the text.
6. In addition to the current control group, which received no educational materials at all, it is recommended to have another control group that receive some kind of non-interactive manipulation to highlight the effectiveness of the current design.