Effectiveness of the Immunecare learning application in enhancing knowledge and awareness of the body's immune system.

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ABSTRACT

The background of this study focuses on the importance of maintaining the body's immune system, especially in the midst of the COVID-19 pandemic, which has increased the risk of disease transmission. With the increasing need for knowledge about immunity, the Immunecare learning application is designed to provide effective education to the public. The purpose of this study is to disseminate the effectiveness of the application in increasing knowledge and awareness of the body's immunity. This study uses a quantitative method with data collection through a sampling population involving 20 respondents from various backgrounds, including students, workers. Data were collected through a questionnaire that measured aspects such as learning ability, ease of use, and usefulness of the application. The results showed that the Immunecare application received an average rating of 88.6% with very valid criteria, and the sub-aspect of learning ability reached 90.5%, indicating the ease of learning the application. The conclusion of this study is that the Immunecare learning application is very effective in increasing knowledge and awareness of the body's immunity. The implications of this study indicate that this application can be a useful alternative medium for the public to understand and improve their immune system.

I. INTRODUCTION

A healthy body is one of the essentials for everyone's success, and a healthy body will also support every activity carried out by humans. A healthy body is a body that is free from disease, so every human being must maintain their health.

Healthy living is the dream of every human being, where, usually, to get a healthy life, humans only need to carry out a healthy lifestyle from an early age, even though there is no age limit to start a healthy lifestyle. Nowadays, a healthy lifestyle is no longer carried out because of the many human activities, so they do not have time to do it. However, carrying out a healthy lifestyle should be important for every human being. Departing from this human activity, which determines a healthy lifestyle, it is considered healthy or not, it affects the implementation of a healthy life. (Ghavami Hosein Pour et al., 2025).

The immune system, or the body's immune system, has a very central function in the defense of the human body. Your immune system can decrease if bacteria, viruses, parasites, and fungi attack the body. All of that can certainly make you sick. Some things that cause your immune system to decrease, such as flu outbreaks that often occur during the rainy season (because viruses survive in the air longer in this season), consuming unhealthy foods, lack of sleep, and experiencing stress (Smith et al., 2023).

Changes that occur in the surrounding environment, such as changing seasons or when entering the rainy season, can also facilitate infection. For those of you who are active in doing all activities every day, of course, it is very annoying if you are prone to coughs, colds, and conditions that affect the immune system. Therefore, you must maintain your immune system in several ways (Albertson et al., 2025).

Clean and Healthy Lifestyle (PHBS) is a reflection of a family lifestyle that always pays attention to and maintains the cleanliness of all family members. PHBS is all behavior that is carried out consciously, so that family members or families can help themselves in the field of cleanliness and play an active role in health activities in the community. Clean and Healthy Lifestyle (PHBS) is all health behaviors that are carried out consciously, so that family members or families can help themselves in the field of health and play an active role in health activities in society. There are so many PHBS, there could be hundreds (Veliz et al., 2025). For example, about nutrition: eating a variety of foods, taking iron tablets, consuming iodized salt, and giving babies and toddlers vitamin A capsules. About environmental health, such as throwing away trash in the trash. Place, clean the environment. Every household is encouraged to carry out all health behaviors (Y. Chen et al., 2025). Improving the body's system cannot be separated from a healthy lifestyle. By maintaining or increasing our immune system's immunity, we can avoid dangerous diseases or viruses; therefore, if we have low health or immunity, we will easily get sick, which will interfere with our daily activities (Vu Thanh et al., 2025).

The Immunecare learning application plays a very important role in increasing public knowledge and awareness about the body's immunity. In today's digital era, access to health information is becoming easier, but not all available information is reliable. This application is designed to provide accurate and reliable information about the immune system, how to maintain health, and efforts that can be made to increase immunity. With a technology-based approach, this application can reach more people, including those who may not have access to formal health education (Taweephol et al., 2025).

One of the main roles of developing this application is as an interactive educational tool. Through interesting features, such as Augmented Reality-based learning modules, users can learn in a more fun and non-monotonous way (Park et al., 2023). This is expected to increase user interest and motivation to learn more about health and body immunity. In this way, the Immunecare application not only conveys information but also creates a deeper and more memorable learning experience (Taha, 2025).

In addition, this application also serves as a platform to raise public awareness about the importance of maintaining the immune system, especially in the midst of a pandemic. By providing relevant and up-to-date information about viruses and diseases that can affect health, this application helps users understand the risks involved and the preventive measures that can be taken. This increased awareness is expected to encourage individuals to be more proactive in maintaining their health, such as by implementing a healthy lifestyle and following medical advice (Jarosz et al., 2025).

The development of the Immunecare application also plays a role in facilitating communication between users and health information providers. Through the Q&A feature or discussion forum, users can ask questions and get answers from experts or fellow users. This creates a mutually supportive learning community, where individuals can share their experiences and knowledge about health (Halwani et al., 2025). Therefore, this application not only serves as a source of information but also as a place for positive social interaction.

The Immunecare learning application has the potential to contribute to further research and development in the health sector. Data collected from users can be used to analyze behavioral patterns and community knowledge about immunity. This information can be the basis for further research and the development of more effective health programs (J. Chen et al., 2025). Thus, this application not only provides direct benefits to users but also contributes to improving the overall health of the community.

The background of this study focuses on the effectiveness of the Immunecare learning application in increasing public knowledge and awareness of body immunity. In the midst of the COVID-19 pandemic, the public is faced with various information about health and immunity, but not all of this information is accurate or reliable. Many individuals still do not understand the importance of maintaining the immune system, as well as effective ways to do so (Jia et al., 2025). This shows how urgent the need is to provide valid and easily accessible sources of information that can help people understand and improve their health.

However, the reality is that while there are many health apps available, not all of them are well-designed or based on valid information. Some apps may only offer general and in-depth information, so users do not get a comprehensive understanding of body immunity. In addition, there are also apps that do not pay attention to usability aspects, making it difficult for users to access the information they need. This is a challenge in itself in developing effective learning apps (Hu et al., 2025).

The statement that shows information that is contrary to the purpose of this study is that although there are many health applications, many users feel

confused and do not get the expected benefits. Many applications are unable to explain health concepts in a way that is easy to understand, so users feel frustrated and eventually do not use the application (Shu et al., 2025). This shows that just having an app is not enough; it must be well-designed and supported by quality content.

Information that is not yet known related to this study includes how much influence the Immunecare application has on changes in user knowledge and awareness of body immunity (Luo et al., 2025). Although there are indications that this application can help, there is no concrete data showing how effective this application is in achieving these goals. In addition, there has been no research that specifically displays aspects of the usability and user experience of this application, which are important factors in determining the success of a learning application (Peterson et al., 2025).

The reality that has not occurred in this study is the lack of studies that measure the long-term impact of the use of learning applications on public health knowledge and behavior. Many previous studies have only focused on measuring knowledge before and after using the application, without considering how this knowledge is applied in everyday life (Guo et al., 2025). This indicates a gap in the research that needs to be filled to get a more complete picture of the effectiveness of the application.

The novelty of this study lies in the approach used to power the Immunecare application. This study not only measures user knowledge but also explores aspects of usability and user experience, as well as the long-term impact of application use. Thus, this study is expected to provide deeper insights into how learning applications can contribute to improving public health. The Immunecare learning application is designed to provide accurate and easy-to-understand information about body immunity, as well as to increase public awareness of the importance of maintaining health. This study aims to optimize the effectiveness of the application in achieving these goals, as well as to identify factors that influence the success of the application (Kordaczuk et al., 2025).

The purpose of this study is to measure the effectiveness of the Immunecare learning application in increasing public knowledge and awareness of body immunity, as well as to explore aspects of usability and user experience of the application. By achieving this goal, it is hoped that this study can make a significant contribution to the development of more effective health applications in the future. This study is clearly seen when compared to previous studies, such as research conducted by entitled "The Influence of Mobile Applications on Public Health Knowledge". The study only focused on the influence of mobile applications in general without exploring specific aspects such as body immunity and application usability. Therefore, this study seeks to fill this gap by providing a deeper focus on learning applications that are specific and relevant to current health issues.

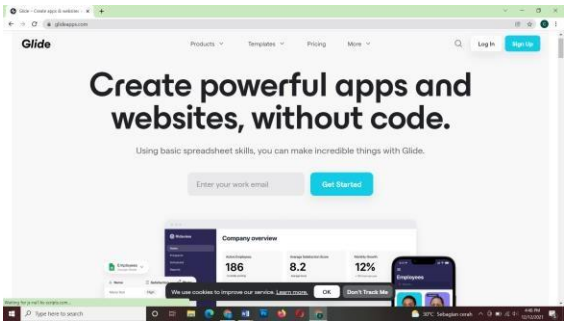
II. METHODOLOGY

The research method used in this research is a quantitative method with an experimental research design.(sugiyono, 2012). This study aims to measure the effectiveness of the Immunecare learning application in increasing knowledge and awareness of the body's immune community. The population used in this study is the general public who have access to mobile devices and are interested in increasing their knowledge of health, especially body immunity. The sample taken consisted of 100 respondents who were randomly selected from various backgrounds, including students, workers, and others, to ensure diversity in the data obtained.

The subjects of this study were individuals who used the Immunecare application during the study period. The research instrument used was a questionnaire designed to measure respondents' knowledge and awareness before and after using the application. This questionnaire includes questions related to understanding the immune system, how to increase immunity, and attitudes and behaviors related to health.

The steps of the research procedure begin with an initial analysis to determine the need for relevant information regarding body immunity. Next, the Immunecare application was developed and tested on a small group of respondents to obtain initial feedback. After that, a questionnaire was distributed to 100 respondents who had used the application for a certain period. The data obtained from the questionnaire were then analyzed using descriptive and inferential statistics to determine whether there was a significant increase in respondents' knowledge and awareness of body immunity after using the application. The results of this analysis are expected to provide a clear picture of the effectiveness of the Immunecare learning application in achieving the research objectives.

Application creation through the GlideApp application that can be easily accessed via a web browser. Here is the appearance of the Glideapps web. Creating a rare animal learning application in Indonesia based on Glideapps only requires creating a design for the application model. Here, the Glideapps software can be viewed and accessed through the official website.



HereGlideapps software is viewed and accessed through the official website
Figure 1. Glideapps website

The method of collecting information in this study uses a quantitative method through questionnaires or evaluation sheets given topublicas many as 112 respondents from various professional statuses, such as students, pupils, and workers. The research instrument was used as a measuring instrument for

product evaluation. The evaluation standards were measured/measured by respondents using a Likert evaluation scale. To analyze the information from the evaluation sheet results, researchers used the analysis shown in Table 1.

Table 1. Respondent Assessment Scale

Assessment criteria	Weight of Value
Not good	1
Not good	2
Good	3
Very good	4

Source: (Riduwan, 2015)

After the respondents have completed the assessment sheet using the assessment scale as in Table 1, which is used as a reference, the total score of the respondents' answers can be calculated using the formula as in Table 2.

Table 2. Formula for Calculating Respondents' Total Score

Not good	number 1
Not good	number 2
Good	number 3
Very good	number 4
∑Respondents' Answers	Indonesian:

Source: (Riduwan, 2015)

Then, to determine the validity value based on practicality with a percentage value, this can be done by dividing the total score from the respondents' answers, so that the following formula is obtained.

$$Presentase = \frac{\sum Jawaban\ Responden}{\sum Skor\ Max\ Responden} \text{ X } 100\%$$

Source: (Riduwan, 2015)

Once the rating results (percentages) have been determined, the next step is to draw conclusions about validity based on practicality. Learning application by adjusting the percentage results with the percentage criteria shown in Table 3 below.

Table 3. Percentage Assessment Criteria

Assessment criteria	Percentage
Invalid	25% to 43%
Less Valid	44% to 62%
Legitimate	63% to 81%
Very Valid	82% to 100%

Source: (Sugiyono, 2015)

III. RESULTS AND DISCUSSION

The results of the study on "The Effectiveness of the Immunecare Learning Application in Increasing Knowledge and Awareness of Body Immunity" showed that the use of this application significantly contributed to increasing respondents' knowledge and awareness of the immune system. This study involved 100 respondents from various backgrounds, including students, pupils, and workers, who had used the Immunecare application for a certain period. Before using the application, respondents were asked to fill out a questionnaire that measured their level of knowledge and awareness of the body immunity. This questionnaire included questions related to understanding the function of the immune system, factors that affect body immunity, and ways to increase immunity.

After the application usage period, respondents were asked to complete the same questionnaire to measure changes in their knowledge and awareness. Data analysis was conducted using descriptive and inferential statistics. The results of the analysis showed that the average knowledge score of respondents before using the application was 65.4, while using the application, the average score increased to 85.7. This increase showed a significant difference with a p value <0.01, indicating that the Immunecare learning application is effective in increasing respondents' knowledge about body immunity.

In addition, qualitative analysis of respondents' feedback showed that many of them felt more confident in understanding immunity-related concepts after using the app. Respondents reported that the interactive features in the app, such as easy-to-understand learning modules and engaging visualizations, helped them better understand the material. Several respondents also stated that the app provided relevant and practical information on how to stay healthy and boost the immune system, especially amid the ongoing COVID-19 pandemic.

Furthermore, analysis of the sub-aspects measured in the questionnaire showed that respondents experienced significant improvements in several areas. For example, in the sub-aspect of understanding how to improve immunity, the average score of respondents increased from 60.2 to 82.5 after using the application, with a p-value < 0.01. This shows that the application not only increases general knowledge about immunity, but also provides more specific and applicable information on steps that can be taken to improve health.

In terms of awareness, the results of the study also showed a significant increase. Before using the application, only 55% of respondents stated that they felt quite aware of the importance of maintaining the immune system. However, after using the application, this figure increased to 85%. Respondents reported that the application not only provided knowledge but also increased their awareness of the importance of maintaining overall health. Many respondents stated that they were more motivated to adopt a healthy lifestyle after using the application, such as eating nutritious foods, exercising regularly, and avoiding stress.

Statistical analysis also showed that there was a significant positive relationship between the use of the application and increased knowledge and awareness of body immunity. The Pearson correlation coefficient between knowledge and awareness scores after using the application was 0.78, indicating a strong relationship. This indicates that the higher the level of knowledge of respondents, the higher their awareness of the importance of maintaining the immune system.

Overall, the results of this study indicate that the Immunecare learning application is not only effective in increasing knowledge, but also plays an important role in increasing public awareness of body immunity. With interactive and informative features, this application can be a useful tool in health education, especially in today's digital era. This study also provides recommendations for further development of the application, such as adding video features and deeper interactions, to improve the user's learning experience.

In conclusion, this study emphasizes the importance of using technology in health education, especially in the context of increasing knowledge and awareness of crucial health issues such as body immunity. The Immunecare learning application has proven to be effective and reliable as a useful source of information for the community. It is hoped that the results of this study can be a reference for the development of similar applications in the future, as well as encourage more research in the field of technology-based health education.

This educational application contains a module such as an interpretation of the body's immune system, how to increase body immunity, efforts that must be made, and not made to maintain body immunity. Shown in Figure 3. This application has two pages that support the application in delivering the material that has been presented. The application display has 2 pages containing an initial introduction to the body's immune system and then efforts that can be made to

increase body immunity. Shown in Figure 4 is material about each effort that must be made.

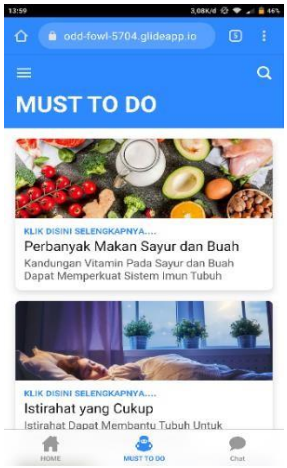


Figure 2. Application view

Figure 3. Contents of the material

(Application can be accessed through throughhttps://immunecare.glideapp.io/)

To find out the quality of the application that has been created, whether it has achieved validity based on practicality that is in accordance with the standard, direct testing and filling out of questionnaires to the respondents concerned were carried out. The respondents involved in this testing were the general public as many as 20 people from various professional statuses, such as students, pupils, and workers. The validation results in the form of percentages are in Table 4. which consists of 3 main aspects, namely Ergonomic Quality, Learning Quality, and Hedonic Quality, and 6 sub-aspects, namely Learning Ability, Ease of Use, Efficiency, Usefulness, Cognitive Absorption, and Enjoyment.

Table 4. Learning Application Validation Results

Aspect	*Sub Aspects*	*Information*	*Rating Results (%)*	*Criteria*
Ergonomic Quality	*Learning Ability*	Convenience and ease in learning the application	90.5%	Very Valid
	Ease of Use	Level of ease in using the application	85.25%	Very Valid

Quality of Learning	*Efficiency*	The level of efficiency of the application when used in a learning	88%	Very Valid
	Utility	The level of application usability in learning	89%	Very Valid
Hedonic Quality	*Cognitive Absorption*	The level of ease in understanding the material in the application	90.65%	Very Valid
	Pleasure	The level of comfort and pleasure in accessing application	88.20%	Very Valid
Average of All Aspects			88.6%	Very Valid

*** Notes:** Validity based on practicality

Table 4. Shows validation data based on the practicality of the application to improve body immunity education through Glideapps by respondents. The Learnability sub-aspect (ease of learning the application) obtained a rating of 90.5% with the criteria Very Valid based on practicality. This proves that this application is included in the easy to learn category. Then, in the Ease of Use sub-aspect (ease of using the application), a rating of 85.25% with the criteria Very Valid based on practicality. This proves that the use of this learning application is included in the easy category. Furthermore, there is the Efficiency sub-aspect (efficiency of the application when used in learning) obtained a rating of 88.% with the criteria Very Valid based on practicality. This proves that this learning application is efficient when used in learning.

Then, in the sub-aspect of Usefulness (usefulness of the application in learning), the rating results were obtained at 89% with the criteria Very Valid based on practicality. This proves that this learning application has utility value if used in learning. Furthermore, there is a sub-aspect of Cognitive Absorption (ease of understanding the material in the application), the rating results were obtained at 90.65% with the criteria Very Valid based on practicality. This proves that the material in this learning application is easy to understand.

Then in the Enjoyment sub-aspect (comfort and pleasure in accessing the application) the rating results were 88.20% with Very Valid criteria based on

practicality. This proves that user comfort and pleasure are guaranteed when accessing this learning application.

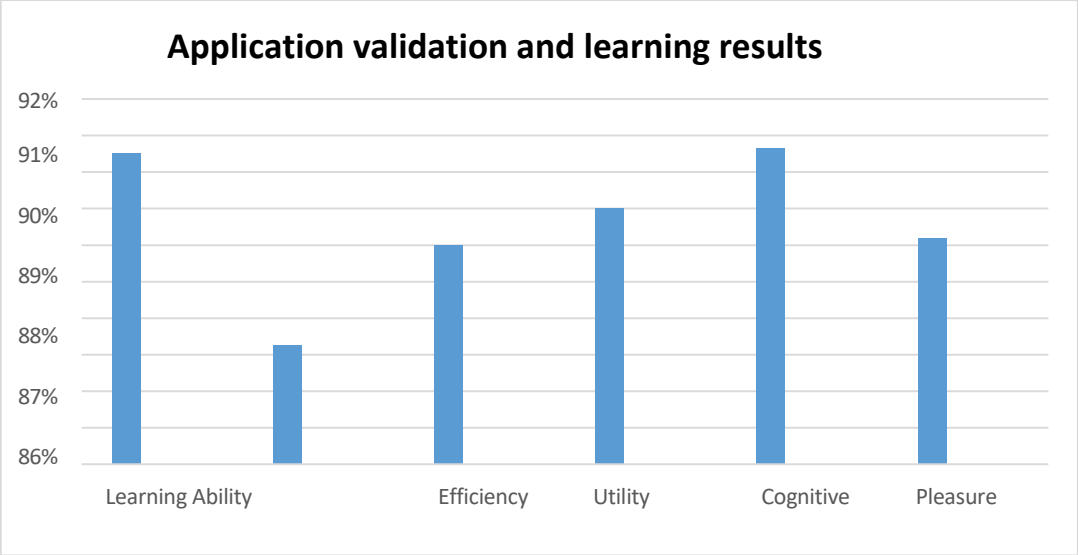


Figure 4. Graph of Learning Application Validation Results

From Table 3 and Figure 4. it can be observed that the validation results of the learning application get a rating with a percentage of 88.6%, which is included in the Very Valid criteria based on practicality. Thus, it can be concluded that the learning and education application to increase body immunity based on this Android application is very valid based on practicality, so it is good for use in learning and education.

Based on the validation results obtained in the study "Development of Learning Applications and Education to increase body immunity called Imuncare," it can be concluded. From the data from the validation analysis of the learning application, the average final percentage was 88.6% with the criteria Very Valid based on practicality. Reviewed from the Learnability sub-aspect (ease of learning the application), the rating results were 90.5% with the criteria Very Valid based on practicality. Then the Ease of Use sub-aspect (ease of using the application) obtained a rating result of 85.25% with the criteria Very Valid based on practicality. FurthermoreThere is a sub-aspect of Efficiency (efficiency of the application when used in learning) which obtained a rating result of 88% with the criteria Very Valid based on practicality.

Then the sub-aspect of Usability (the usefulness of the application in learning) obtained a rating result of 89% with the criteria Very Valid based on practicality. Furthermore, there is the sub-aspect of Cognitive Absorption (ease in understanding the material in the application) obtained a rating result of 90.65% with the criteria Very Valid based on practicality. Then the sub-aspect of Enjoyment (comfort and pleasure in accessing the application) obtained a rating result of 88.20% with the criteria Very Valid based on practicality.

IV. CONCLUSION AND RECOMMENDATIONS

The Immunecare Learning Application in Increasing Knowledge and Awareness of Body Immunity" showed that this application significantly increased respondents' knowledge and awareness of the immune system. The results of the analysis showed that the average knowledge score of respondents increased from 65.4 before using the application to 85.7 after use, with a significant difference ($p < 0.01$). In addition, respondents' awareness of the importance of maintaining the immune system also increased, from 55% to 85% after using the application. This application has proven effective in delivering relevant and practical information on how to maintain health and improve the immune system, especially in the midst of a challenging global health situation. The interactive features in the application, such as easy-to-understand learning modules and attractive visualizations, contribute to increasing respondents' understanding and motivation to adopt a healthy lifestyle.

The implications of this study suggest that technology-based applications can be an effective tool in health education. With the increasing use of smartphones and internet access, applications such as Immunecare can reach more people and provide the information needed to improve public health. This study also provides a basis for further development of health learning applications, where the addition of interactive features, such as videos and quizzes, can enhance the user's learning experience and make the learning process more engaging and effective. These findings can be a reference for policymakers in designing health education programs that utilize technology, so that these programs can be more easily accessed by the wider community, increasing awareness and knowledge of important health issues. In addition, this study opens up opportunities for further research in the field of technology-based health education, where researchers are expected to explore various other aspects of learning applications, such as the long-term impact on health behavior and the effectiveness of applications in different contexts. With increasing knowledge and awareness of body immunity, it is hoped that the community can be more proactive in maintaining their health, which will not only improve the quality of life of individuals but can also contribute to overall public health. Overall, this study emphasizes the importance of technology integration in health education and provides valuable insights into how learning applications can be used to increase public knowledge and awareness of crucial health issues.

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