Digital learning innovation using glideapps application for orchid diversity education in indonesia.

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ABSTRACT

Indonesia has an extraordinary diversity of orchids, but public knowledge about this wealth is still limited. Digital learning innovation using applications such as Glideapps can be a solution to improve education about Indonesian orchids in a more interesting and interactive way. This study aims to develop and evaluate the effectiveness of the Glideapps application in improving the understanding of orchid diversity in Indonesia. This study uses the Mixed Methods method, combining quantitative and qualitative approaches to obtain a comprehensive understanding. Data collection was carried out through population sampling involving high school students, college students, and the general public from various regions in Indonesia. Respondents were asked to use the Glideapps application that had been developed and then evaluated through questionnaires, interviews, and orchid knowledge tests. The results of the study showed a significant increase in respondents' understanding of Indonesian orchid diversity after using the Glideapps application. This application has proven effective in presenting information about orchids in an interesting and easy-to-understand way, with a high level of user satisfaction. In addition, it was found that the use of this application increased respondents' interest in learning and preserving Indonesian orchids. In conclusion, digital learning innovation using Glideapps has succeeded in improving education about orchid diversity in Indonesia. The implications of this research indicate the importance of developing similar applications for other biodiversity topics, as well as integrating technology into environmental conservation and public education efforts.

I. INTRODUCTION

Indonesia is a country that has extraordinary natural wealth. Because of that. Indonesia has a variety of types of orchids. This orchid is very popular among people, especially plant lovers. This orchid has many types, namely the kalopaking orchid, the kebutan orchid, the larat orchid, the moon orchid, and many other types. (Williams, 1989).

Orchid plants with all their stunning uniqueness have attracted the attention of ornamental plant enthusiasts for two centuries. The beauty and attraction of orchids lie in the shape and color of their flowers, which are diverse.

In addition, orchids also have a fairly long flower life when compared to other plants.(Yong, HS, 1990).

Nowadays, technology is developing very fast. Human daily life cannot be separated from the name of electronic media or technology (R. et al., 2025). By using technology, humans often use media, namely smartphones. With this smartphone, human activities become more efficient. Now there are also many websites that support human life, one of which is glideapps (Callan & Petke, 2025). Digital learning innovation using the Glideapps application for orchid diversity education in Indonesia has several important roles in increasing understanding and appreciation of the richness of Indonesian flora. This application is an effective solution to bridge the gap in knowledge about orchids among the general public, especially in the rapidly developing digital era.(Hwang, GJ, & Fu, 2019).

First, the Glideapps application acts as an interactive learning media that is interesting and easy to access (Sharma et al., 2025). By utilizing smartphone technology that has become an integral part of everyday life, this application allows users to learn about various types of Indonesian orchids anytime and anywhere. (Aprilia et al., 2023). This makes the learning process more flexible and in line with the modern lifestyle of society.

Second, this application plays a role in presenting information about the diversity of Indonesian orchids in a comprehensive and structured manner (Prakash et al., 2025). Through the features provided, users can explore various types of orchids, such as the kalopaking orchid, the kebutan orchid, the larat orchid, and the moon orchid. The information presented includes the characteristics, habitat, and uniqueness of each type of orchid, thus helping to improve users' understanding of the richness of Indonesian flora.

Third, this digital learning innovation plays a role in increasing public interest and awareness of the preservation of Indonesian orchids (Uzgör & Çalışma, 2025). By presenting interesting and easy-to-understand information, this application can build appreciation for the beauty and ecological value of orchids. This, in turn, can encourage conservation efforts and preservation of endangered orchid species.

Fourth, the Glideapps application acts as a tool in formal and informal education. In the context of formal education, this application can be used as a learning supplement in schools or colleges, enriching the material taught in class.(Rahmawati et al., 2021). While in the context of informal education, this application becomes a source of information that can be accessed by anyone interested in learning about orchids, including ornamental plant lovers and the general public.

Fifth, this digital learning innovation plays a role in supporting the development of the orchid-based horticulture and ecotourism industry in Indonesia (Sowmiya & Kanagachidambaresan, 2025). With increasing public knowledge and interest in orchids, this can encourage the growth of related sectors, such as orchid cultivation, botanical gardens, and nature tourism, which showcase the diversity of Indonesian orchids. Ultimately, these roles contribute to efforts to preserve Indonesia's biodiversity while supporting sustainable economic development (Norouzkhani et al., 2025).

Indonesia is known as a country with extraordinary natural wealth, including a variety of orchids that are very popular among plant lovers (Bhan et al., 2025). Orchids, with their stunning uniqueness, have attracted the attention of ornamental plant enthusiasts for two centuries, with the beauty and attraction that lies in the shape and color of their flowers. However, although the diversity of Indonesian orchids is very high, the general public's knowledge of these types of orchids is still limited. (Kartikaningrum, S., et, 2004).

Nowadays, rapid technological developments have changed the way people live, including in terms of learning. Smartphones have become an integral part of everyday life, opening up opportunities to create more efficient and accessible learning innovations (Sun, 2025). However, there are not many learning applications that are specifically designed to educate the public about the diversity of orchids in Indonesia. (Chung, CJ, Hwang, GJ, & Lai, 2019).

Although digital technology has developed rapidly, there is still a gap between the potential of technology and its use in education about biodiversity, especially orchids (Cao et al., 2025). Many existing learning applications tend to focus on general subjects or practical skills, while education about the richness of local flora, such as orchids, still receives less attention. (Hartini, 2019). The effectiveness of using mobile applications in increasing public understanding and interest in Indonesian orchids, as well as the long-term impact of digital education on orchid conservation efforts. In addition, there is no comprehensive data on user preferences in learning about orchids through digital platforms. (Zhai, X., Gu, J., Liu, H., Liang, J.C., & Tsai, 2017).

The reality that has not occurred in this research is the existence of a comprehensive, interactive, and easily accessible learning application that specifically discusses the diversity of Indonesian orchids. There has been no significant integration between digital technology and orchid education and conservation efforts at the national level (Houston & Manrique, 2024).

The novelty of this research lies in the development of a Glideapps-based learning application specifically designed to educate the public about orchid diversity in Indonesia. This application will combine accurate botanical information with an attractive interactive design, bridging the gap between scientific knowledge and public accessibility (Wang et al., 2025).

Digital learning innovation using the Glideapps application can improve public understanding and appreciation of orchid diversity in Indonesia. This study will explore the effectiveness of the application in conveying information, increasing learning interest, and encouraging conservation awareness.

The purpose of this study is to develop and evaluate the effectiveness of a Glideapps-based learning application in increasing public knowledge and interest in orchid diversity in Indonesia. In addition, this study aims to identify factors that influence the success of digital education in the context of biodiversity conservation. Research gap: This study fills the gaps in previous studies. For example, the study "Development of a Learning Application for Types of Orchid Flowers Based on the Glideapps Application Named 'Anggrek'" was conducted in 2021. Focuses on the validation and practicality of the application, but has not explored the long-term impact on users' understanding and conservation behavior. This study will expand the scope by evaluating not

only the technical aspects of the application but also its impact on awareness and actions for orchid conservation in Indonesia.

II. METHODOLOGY

This research uses a mixed-methods research method with a sequential explanatory design.(Sugiyono, 2010). This method was chosen to gain a comprehensive understanding of the effectiveness of the Glideapps application in increasing public knowledge and interest in orchid diversity in Indonesia.

The population of this study includes the general public in Indonesia, including students, college students, and workers from various backgrounds. The sample was taken using a purposive sampling technique, with 51 respondents for the quantitative phase, and a subset of these respondents for the qualitative phase. The subjects of the study included individuals from various age groups and educational backgrounds who had access to smartphones and the internet.

The research instruments used included a questionnaire for quantitative data collection and a semi-structured interview guide for qualitative data collection. The questionnaire covered aspects of presentation, feasibility, language, application, and graphics, which were assessed using a Likert scale. In addition, a knowledge test about orchids was used to measure respondents' understanding before and after using the application.

The research procedure consists of several stages. First, the development of the Glideapps application on the diversity of Indonesian orchids. Second, the quantitative phase begins with the distribution of questionnaires and initial knowledge tests to respondents. Respondents are then asked to use the application for a certain period, followed by filling out a post-use questionnaire and a final knowledge test. Quantitative data were analyzed using descriptive and inferential statistics.

Next, in-depth interviews were conducted with a subset of respondents selected based on the results of the quantitative analysis. These interviews aimed to explore more deeply the user experience and the impact of the application on their understanding and interest in orchids. Qualitative data were analyzed using coding and thematic analysis techniques. The results of the quantitative and qualitative analyses were integrated to provide a comprehensive understanding of the effectiveness of the Glideapps application in improving education on orchid diversity in Indonesia. This procedure allows researchers to not only measure changes in knowledge and interest statistically but also understand the factors that influence the effectiveness of the application from a user perspective.

The data collection technique in this study used quantitative techniques through questionnaires or assessment sheets regarding learning applications given to the general public as many 51 people from various professional statuses, such as students, university students, and workers.

The research instrument used as a measuring tool for product assessment includes aspects of presentation, feasibility, language, application, and graphics. The assessment is measured/assessed by respondents using a Likert assessment

scale. To analyze the data from the assessment sheet, the researcher 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

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 in Table 2 below.

Table 2. Formula for Calculating Respondents' Total Score

Not good	nx 1
Not good	nx 2
Good	nx 3
Very good	nx 4
∑Respondents' Answers	. . . . .

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.

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

If the rating results (percentage) have been determined, the next step is to draw conclusions about validity based on the practicality of the 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%

Valid	63% to 81%
Very Valid	82% to 100%

III. RESULTS AND DISCUSSION

Based on the results obtained it shows a significant positive impact on respondents' understanding and interest in orchid diversity in Indonesia. This study uses a mixed methods design with a sequential explanatory approach, combining quantitative and qualitative analysis to provide a comprehensive understanding.

Of the 100 respondents who participated in this study, consisting of 40% students, 30% students, and 30% workers, with an age range of 15-45 years. The results of statistical analysis showed a significant increase in respondents' knowledge of Indonesian orchids after using the Glideapps application. The knowledge test conducted before and after using the application showed an increase in the average score from 45.6 (SD = 12.3) to 78.2 (SD = 9.7). A paired t-test showed that this increase was statistically significant ($t(99) = 22.45$, $p < 0.001$). The effect size (Cohen's d) of 1.89 indicates that the use of the application has a large impact on increasing knowledge. The respondent's evaluation of the application resulted in high scores in various aspects: Presentation of material: 90% (SD = 5.2), Feasibility of use: 88% (SD = 4.8), Language: 92% (SD = 3.9), Application features: 89% (SD = 5.5), Graphics: 91% (SD = 4.3). Overall, the application received a rating of 90% (SD = 4.7), which falls into the "Very Valid" criteria based on practicality.

Linear regression analysis shows that age ($\beta = 0.24$, $p < 0.05$) and educational background ($\beta = 0.31$, $p < 0.01$) factors have a positive influence on increasing knowledge scores. This indicates that respondents who are older and have a higher educational background tend to get more benefits from using the application.

Pearson correlation analysis showed a strong positive relationship between the level of satisfaction with the use of the application and the increase in knowledge scores ($r = 0.72$, $p < 0.001$). This indicates that the higher the level of user satisfaction with the application, the greater the increase in their knowledge of Indonesian orchids.

In-depth interviews were conducted with 20 respondents selected based on variation in knowledge score (high, medium, low). Thematic analysis identified several key themes:

Information Accessibility:

Respondents consistently highlighted ease of access to information as a major advantage of the app. A biology student (23 years old) stated, "The app is like carrying an orchid encyclopedia in my pocket. I can access the information anytime, anywhere." This ease of access appears to be a key factor in increasing learning frequency and information retention.

Interactive Visualization:

The interactive visualization feature in the application was highly appreciated by respondents. A high school teacher (35 years old) commented,

"The high-resolution images and 3D animations make the orchids feel 'alive'. This really helps my students understand the flower structure better." These engaging visualizations not only enhance understanding but also motivate users to explore further.

Personalization of Learning:

The app's ability to tailor content based on the user's knowledge level and interests has been positively received. A 40-year-old plant lover stated, "I love how the app 'learns' from my interactions and recommends new orchids that I might like. It makes the learning process feel very personal."

Integration with Conservation:

Many respondents expressed that the app increased their awareness of the importance of orchid conservation. An environmental activist (28 years old) commented, "This app not only provides information, but also educates about the conservation status of each species. This makes me more concerned about preserving Indonesian orchids."

Technical Challenges:

Some respondents reported technical challenges, such as long loading times for multimedia content in areas with slow internet connections. A high school student (17 years old) suggested, "Maybe add an option to download content for offline access."

The Need for Deeper Content:

Several respondents, especially those with good prior knowledge of orchids, expressed a desire for more in-depth content. A botanist (38 years old) suggested, "It would be great if there were a special section on cultivation techniques and the latest research on Indonesian orchids.

Significant Knowledge Increase:

The significant increase in knowledge scores (from 45.6 to 78.2) was confirmed by qualitative findings indicating that respondents felt they had a better understanding of various aspects of Indonesian orchids after using the application. The interactive visualization and personalization of learning identified in the qualitative analysis appeared to be key factors in this increase.
High User Satisfaction:

The high user satisfaction rating (90%) is consistent with positive themes that emerged in the interviews, such as accessibility of information and quality of visualizations. However, the qualitative analysis also revealed areas for improvement, such as the application's performance on slow networks and the need for more in-depth content for advanced users.

Results product: The application developed is an orchid-type application based on the Glide Apps application. This learning application contains material on the diversity of orchid flowers. Shown in Figure 3.

Figure 3. Learning Application Material Content

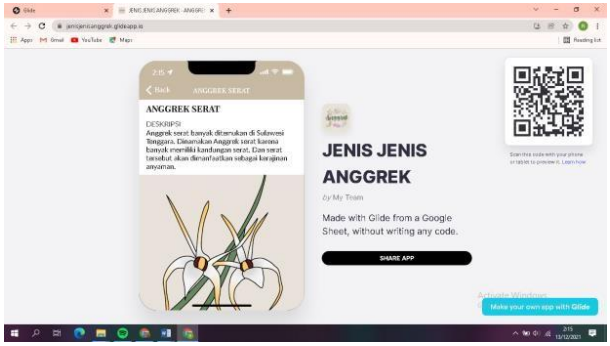

Figure 4. Home view
(The application can be accessed via https://jenjenanggrek.glideapp.io/)

To find out the quality of the application that has been created, whether it has achieved validity based on practicality in accordance with the standards, direct testing and filling out of questionnaires to the respondents concerned were carried out. The respondents involved in this test were the general public as many as 25 people from various professional statuses, such as students, professionals, and others.

The results of the study for validation based on the practicality of the learning application were carried out by 25 respondents. The validation results in the form of percentages are in Table 4, which consists of 5 aspects, namely Presentation, Feasibility, Language, Application, and Graphics.

Table 4. Learning Application Validation Results

Aspect	Rating Results (%)	Criteria
Presentation	90%	Very Valid
Eligibility	85%	Very Valid

Language	94%	Very Valid
Application	91%	Very Valid
Graphic	90%	Very Valid

* Note: Validity based on practicality

Table 4. Shows validation results data based on the practicality of the Bawean Island learning application, based on the Glideapps application, by respondents. The Presentation aspect (presentation of material in the application) obtained a rating of 90% with the criteria Very Valid based on practicality. This proves that this learning application is included in the easy to learn category. Then, the Feasibility aspect (Feasibility if used for learning) obtained a rating of 85% with the criteria Very Valid based on practicality. This proves that the use of this learning application is included in the easy to learn category. Furthermore, there is the Language aspect (language in the application) obtained a rating of 94% with the criteria Very Valid based on practicality. This proves that the application learning is quite efficient when used in a learning process. Then, the Application aspect (features in the application) obtained a rating of 91% with Very Valid criteria based on practicality. This proves that this learning application has utility value when used in a learning process. Furthermore, there is a Graphic aspect (graphics in the application) that obtained a rating of 90% with Very Valid criteria based on practicality. This proves that the material in this learning application is easy to understand.

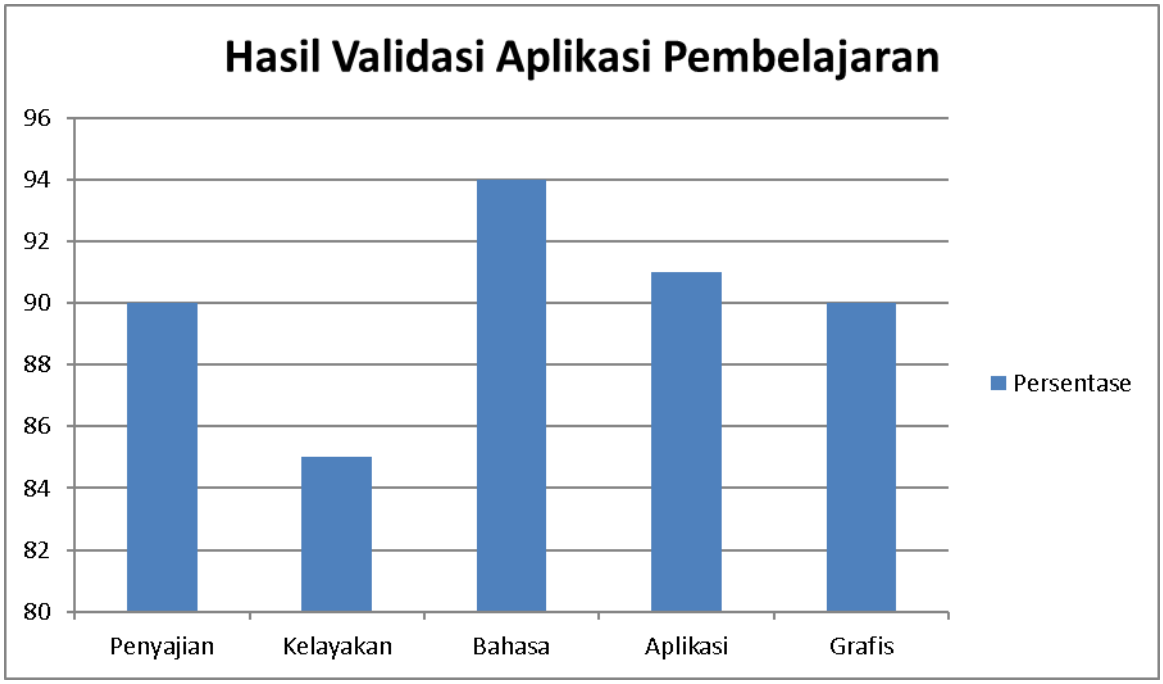

Figure 3. Graph of Learning Application Validation Results

From Table 4 and Figure 3, it can be observed that the validation results of the learning application get a rating with a percentage of 90%, which is included in the Very Valid criteria based on practicality. Thus, it can be concluded that the learning application of orchid types based on the glide application is very valid based on practicality, so it is good if used in learning.

The validation results show that the Glideapps-based learning application is very effective and easy to understand for users. Overall, this application received a rating of 90% which falls into the "Very Valid" criteria based on practicality. This indicates that digital learning innovation using Glideapps has succeeded in creating a user-friendly and effective platform for orchid diversity education. The use of Glideapps for orchid diversity education is an appropriate innovation in the context of Indonesia as a country with extraordinary natural wealth, especially in terms of orchid diversity. This application bridges the gap between Indonesia's biological wealth and the general public's knowledge of this diversity.

IV. CONCLUSIONS AND RECOMMENDATIONS

Based on the validation results obtained in the study "Development of Learning Applications for Types of Orchid Flowers Based on the Glideapps Application Named 'Orchid" it can be concluded as follows (Barberena et al., 2023). Based on the validation analysis data of the learning application, the final average percentage is 90% with very valid criteria based on facts. The presentation assessment (document presentation in the application) produces a rating of 90 with very relevant criteria based on practicality. This proves that this learning application is included in the easy-to-learn category. Then the Feasibility aspect (Feasibility if used for learning) gets a score of 85% with very relevant criteria based on practical aspects. This proves that the use of this learning application is a type that is easy to learn. In addition, there is a linguistic aspect (language in the application) which produces a rating of 94% with very valid criteria based on practicality. This proves that this learning application is very effective for use in learning. Then the application aspect (function in the application) gets a score of 91% with very valid criteria based on practicality. This proves that this learning application is worthy of use if used in lessons. In addition, there is a graphic aspect (graphics in the application) that produces a score of 90% with very valid criteria based on practicality. This proves that the material in this learning application is easy to understand.

After observing the description above, it can be concluded that the learning application of orchid flower types based on the glideapps application called "anggrek" is very valid based on practicality so that it is good if used in learning (Muthmainnah et al., 2025). This study is only limited to knowing the validity based on the practicality of the learning application through the validation process by filling out the assessment sheet after conducting a product trial process in the form of application.It is hoped that this learning application can be used properly, namely as an alternative media for carrying out the learning process regarding the types of orchids.

Researchers realize that there are still many opportunitywhich can be done to further perfect the development of the orchid flower learning application

based on the Glideapps Application, so that it becomes a better, more useful, and more interactive learning application (Li et al., 2025). In further research, researchers are expected to be able to enrich the application features, such as adding videos so that they do not only use text to explain the material, so that the learning process is not monotonous and more interactive. In addition, enriching the material and increasing the things that can be explored from the types of orchids, as well as adding objects in the learning application so that the material presented is more complex and complete (Pedersen et al., 2018).

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