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Physically based learning activities through recreation are assisted by I-Bird Apps in improving identification skills

Las actividades de aprendizaje basadas en la física a través de la recreación cuentan con la ayuda de las aplicaciones I-Bird para mejorar las habilidades de identificación

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Abstract. The ability of self-efficacy and self-regulation is important for students to have, both of Smartphone technology advancements can create with various applications specifically designed to support the learning process. Smart-content can be designed and used as a tool to help the learning process. This study aims to improve the identification skills of prospective biology teachers utilizing a smartphone application in physical-based learning activities through recreation. Applications are design and created specifically to identify birds in zoology vertebrate lectures. We made the application named i-Bird app, in which there is content about birds. This study used the quasi-experimental method with a randomized control group pretest-posttest design. They have involved as many as 82 students divided into two groups. Forty-four students use the i-Bird application (BA) and 38 students use the guidebook (GB). The results showed that the student's identification skills increased significantly, BA (n-gain = 0.75) with a high category and GB (n-gain = 0.42) included in the medium category. The results of the t-test analysis (p-value = .001) showed that there was a significant difference in student identification skills between BA and GB. The results of this study can provide information that the use of smartphone applications that are precisely designed by the needs will be able to achieve maximum results. Specially designed smartphone applications have positive implications in developing innovative learning.
Keywords: identification skills; i-Bird application; birds; physical-based learning.

Resumen. Es importante que los estudiantes tengan la capacidad de autoeficacia y autorregulación; ambos avances tecnológicos de los teléfonos inteligentes pueden crear con varias aplicaciones diseñadas específicamente para apoyar el proceso de aprendizaje. El contenido inteligente se puede diseñar y utilizar como herramienta para ayudar en el proceso de aprendizaje. Este estudio tiene como objetivo mejorar las habilidades de identificación de los futuros profesores de biología que utilizan una aplicación de teléfono inteligente en actividades de aprendizaje físico a través de la recreación. Las aplicaciones se diseñan y crean específicamente para identificar aves en conferencias de zoología sobre vertebrados. Creamos la aplicación llamada i-Bird app, en la que hay contenido sobre aves. Este estudio utilizó el método cuasiexperimental con un diseño pretest-postest de grupo control aleatorio. Han involucrado hasta 82 estudiantes divididos en dos grupos. Cuarenta y cuatro estudiantes utilizan la aplicación i-Bird (BA) y 38 estudiantes utilizan la guía (GB). Los resultados mostraron que las habilidades de identificación de los estudiantes aumentaron significativamente, BA (n-gain = 0,75) con una categoría alta y GB (n-gain = 0,42) incluida en la categoría media. Los resultados del análisis de la prueba t (valor p = 0,001) mostraron que había una diferencia significativa en las habilidades de identificación de los estudiantes entre BA y GB. Los resultados de este estudio pueden proporcionar información de que el uso de aplicaciones para teléfonos inteligentes diseñadas con precisión según las necesidades podrá lograr los máximos resultados. Las aplicaciones para teléfonos inteligentes especialmente diseñadas tienen implicaciones positivas en el desarrollo de un aprendizaje innovador.
Palabras clave: habilidades de identificación; aplicación i-Bird; aves; aprendizaje basado en la física.

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Introduction

The Smartphone technology is increasing. Its development affects all aspects, especially education (Fernández Batanero et al., 2021). A variety of increasingly sophisticated features supports smartphone technology advancements. Various applications are easy to install and use as needed (Díaz-Quesada et al., 2023). Of course, positive progress if developed appropriately. Technological advances can be design and integrated into learning so that they can meet students' needs for learning. The progress of information and communication technology provides new opportunities in education, using computational technology that is relevant in the development of learning so that it can offer unique experiences for students to (Yadav & Chakraborty, 2018). One of the fastest-growing trends in the growing mobile device with its increasingly sophisticated features. The growth of smartphones has an important role and use in education, learning, and almost all students have more than one smartphone that can apply to facilitate the learning process. Thus the development of technology, especially smartphones, can be used as an innovative learning model or method that aims to improve the effectiveness of the learning process (Roy et al., 2019). At present many applications are used to support learning by utilizing social media applications such as WhatsApp, Twitter, Line, Facebook, Instagram, and the YouTube application the results are quite useful to improve even some studies develop smartphone applications in the form of games to support learning.

Innovation in learning always experiences rapid development, along with the development of science and technology. A variety of innovative methods, models and approaches are created with no other purpose to improve learning to be more productive (Drewry et al., 2019). A teacher can do technology integration in developing learning innovations; one of them is by using a smartphone application. Smartphones are one of the most commonly

used and accessible devices for people all over the world, and various smartphone applications are developed with multiple platforms to meet user needs especially to improve the learning process quickly and effectively (Salman & Kanigoro, 2020). Mobile technology can be developed to help students access information better, engage in scientific research and can improve group performance and can foster a positive attitude. Indirectly the use of smartphone applications among students will build student self-regulation and self-efficacy so that they will be aware of the importance of learning. With the right guidance and instruction to students, the use of smartphones in learning will be more exciting and can increase cognitive ability and student involvement in learning (Winarni & Purwandari, 2019). The use of new technology will encourage the exploration of effectiveness and collaborative learning in various fields of science if adequately designed. Thus many benefits will be obtained if a smartphone application can develop to support the learning process (Avidan et al., 2021). Creating effective and efficient learning in achieving goals is, of course, the hope of teachers/lecturers and students. Mobile technology plays an essential role in student academic life; digital devices can connect users to the world directly, increase accessibility to information and enable users to interact with each other, improve student achievement so that it can adopt in pedagogical learning methods. Smartphone devices will potentially provide more meaningful learning opportunities and increase student involvement and will provide opportunities for learning anywhere, changing lifelong learning patterns can shape learning behavior. Affordability of the use of smartphone technology can increase acceleration in learning, facilitate data collection, analysis and presentation so that it can encourage collaboration and enhance interaction between students to conduct discussions and will create new meaning and understanding in learning as part of the scientific learning process.

Necessary identification skills possessed by prospective biology teacher students (Coroller & Flinois, 2023). Excellent identification skills will help them describe something correctly. Students own the ability to identify very important species so that they can preserve and protect biodiversity as an effort of sustainable development (Paradise & Bartkovich, 2021). Thus students should be equipped with identification skills that are integrated into the learning process to foster awareness of the importance of biodiversity conservation. Traditional identification skills still rely on the sensitivity of the five senses, such as the various characteristics of a bird species that the eye can see, the distinctive sound of a bird that the ear can hear, and sensitivity to the bird's habitat because it has had a long-standing ecological relationship with the local community. However, traditional identification skills have various limitations, including the five senses needing to be more extensive in identifying distant objects and being able to reach objects that are widely spread. In addition, traditional species identification will take a long time and incur quite high costs if it involves many volunteers to carry out identification, with the probability of finding a species being relatively small and the effectiveness being low (Guo & Liu, 2017; Prihatini et al., 2023; Rath et al., 2022; Tatar et al., 2023; Wheeldon et al., 2019). For students, identifying bird species can be done using a biology textbook to find out the various characteristics of a bird species, such as the shape of the beak, the pattern and color of the bird, the shape of the bird's feet, the typical style when flying in the air, the bird's usual sound, and so on; then matched when observing and identifying birds in the field (Prokop & Rodák, 2009).

Identification skills can assist with smartphone applications. Many things can be exploring identification skills with various methods and appropriate learning approaches, learning approaches and methods for identifying increasing knowledge about species, supporting sustainable development for that students must be introduced to an authentic environment (Gerl et al., 2021). Thus it is clear to us that learning is not always limited in classrooms; nature as a learning resource has provided the authentic potential to learned. Necessary identification skills possessed by students because it will give many benefits for the future. In this case, the identification of several species is essential for students to have and applied in learning, and this aims to foster students' awareness of the importance of preserving living things and conservation efforts. Identification of species as a conservation effort. Safeguarding and protecting biodiversity, monitoring species and most importantly preserving nature's nature. Besides, identification skills will be beneficial to other competencies such as the ability to think creatively. A proper identification ability will encourage someone to have creativity as a special skill and increase the ability to interact with nature. The ability to think creatively will make identification easier.

Identification skills can do in various ways or approaches in learning by observing images, photos, video recordings, internet assistance and even using traditional methods using dichotomy keys (MacPhail et al., 2020). Exploring identification skills can be done collaboratively with the help of the internet and can be done with video recordings or using good camera. The identification process requires observing high-quality images or photos, and internet databases can help identify species if it is difficult to get pictures that are close enough to high quality. Besides, to identify species many dichotomous keys are used which have seen as still useful, but new methods are needed that are simpler and easier to implement such as using card games and association methods to improve identification skills, the process identification with the correct procedure will produce an expected result. Indonesia has a reasonably high diversity in the world. West Java, in particular, there are 467 bird species and as many as 64 species are endemic. This study

aims to improve identification capabilities by using the i-Bird application by creating smart-content for prospective teacher students at FKIP Universitas Pasundan, Bandung Indonesia. Some indicators of identification capabilities were developed and used to create test questions.

Method

This study used the quasi-experiment method with the pretest-posttest control group design. Involved 82 prospective biology students at Universitas Pasundan, Bandung, Indonesia. Students divided into two groups, as many as 44 students use the i-Bird application and as many as 38 students use a biology guidebook which is still classified as a traditional bird identification method. This research was carried out in the lecture of vertebrate zoology to study Aves. Data collection using test questions and interviews. Identification carried out in the classroom and the neighborhood around the student's residence (Figure 1). .

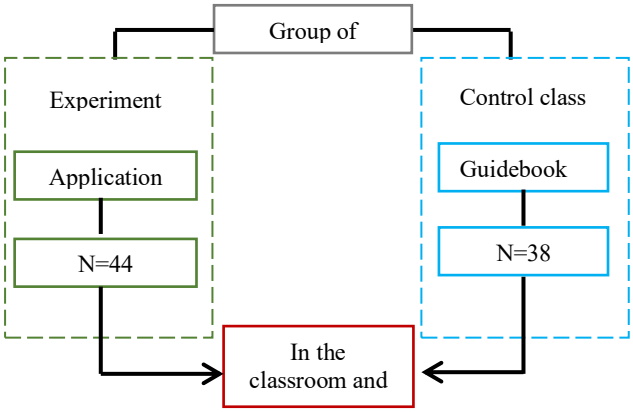


Figure 1. Research design

I-Bird Application

This application specially designed to identify Aves. This application is specifically for users of Android version 4.0.3 and above. The database stored on the product fire-base on Google. The programming language uses JAVA. The Android SDK used to make this application is android SDK 4.0.3. (Ice Cream Sandwich). This application is online; at the beginning of using the app will automatically download data from cloud storage online. This application will automatically update the data along with the Android version update. The application developed contains content from various classes in West Java. In learning, students can take pictures with their smartphone cameras, create photographs and describe images. The results of student work stored in the database.

Figure 2. Flow prototype i-Bird application; A. Homescreen i-Bird application. B. Display for login by entering NIM and Name; C. Display of tasks, if click identification then appears in picture D; D. Display identification tools, if you click identification morphology go to figure E. if you click the question enter the picture F; E. Views for uploading birds and morphological descriptions, if birds have been successfully uploading, they can be identified based on their morphology (coconut, body, wings, legs, and tail; F. Display for working on questions, identification skills and classification abilities in multiple-choice forms.

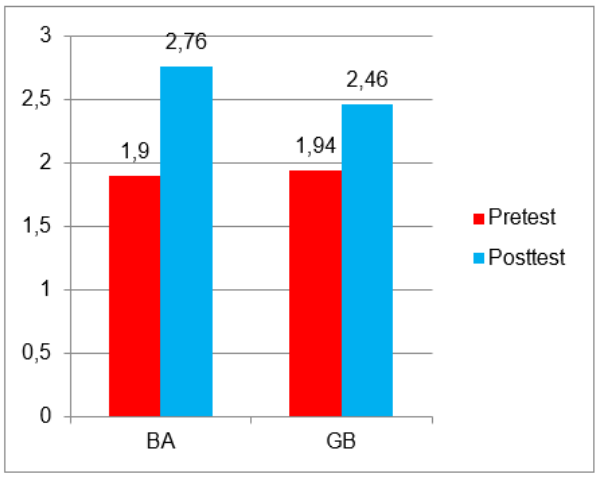


Figure 3. Average score pretest and posttest identification skills of BA and GB.

Result

The results of the research data were capture through pretest before learning using the i-Bird application (BA) and the guidebook (GB) was then posttest. As a prerequisite for parametric tests, a normality test, a homogeneity test, and a significance test carried out using the paired-sample t-test.

The average score of identification skills pretest that BA of 1.90 and the identify skills GB of 1.94. While the average rating of the posttest identification skills of BA is 2.76 and the identification skills of GB is 2.46. These results cannot yet use as a guide to conclusions. Therefore statistical measures need to be taken. The parametric test in this study used the paired-sample t-test. They were assuming that the samples from the two experimental groups > 30: parametric test conducted to test hypotheses—test hypotheses using a t-test performed on pretest

and posttest. Data on student identification skills to see an increase in identification skills in both groups. The paired-sample t-test also conducts to see whether there were differences in the identification skills of BA and GB.

Table 1.
t-test identification skills of BA and GB

		Paired Differences							
					α = .05				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	Posttest BA – posttest GB	.26842	.47936	.07776	.11086	.42598	3.452	37	.001

The sig value (p-value) at $\alpha = 0.05$ is $0.001 < 0.05$. H0 rejected, thus it can conclude that there is a significant difference in the identification skills of BA and GB. Based on the N-gain score analysis, the identification skills of BA with an N-gain score of 0.75 included in the high category. Shows that the increase in student identification skills using the i-Bird application increased significantly with a high increase. N-gain score analysis of the identification skills. GB with an N-gain score of 0.42. It included in the medium category. Shows that the increase in the identification ability of students using manuals increases significantly with moderate increases.

Discussion

The rapid development of technology should maximally utilize in learning (Ricardo-Barreto et al., 2020). Technology helps simplify work if used properly. One effort to use technology is by designing or developing a learning model or method that integrates technology in it (Innocenti et al., 2019). In this study, researchers tried to create a prototype in the form of a smartphone application that used for lectures on Vertebrate Zoology, which was named the i-Bird application. This application used to measure the identification and classification ability of prospective biology teachers. Based on the results of the study showed that the identification ability of students showed an increase in both groups of students both using the i-Bird application (N-gain = 0.75) and the guidebook (N-Gain = 0.42). However, a significant increase was found in students using the i-Bird app compared to the guidebook. Through a significance test using the t-test, there is a significant difference between students using the i-Bird application and students utilizing the guidebook (p-Value = 0.001). With the results of these studies can be obtained information that the use of technology designed and used appropriately can support learning (Gan et al., 2016). Mobile technology could be designed as a learning innovation so that it becomes innovative learning. Technology could integrate into the curriculum to increase learning effectiveness.

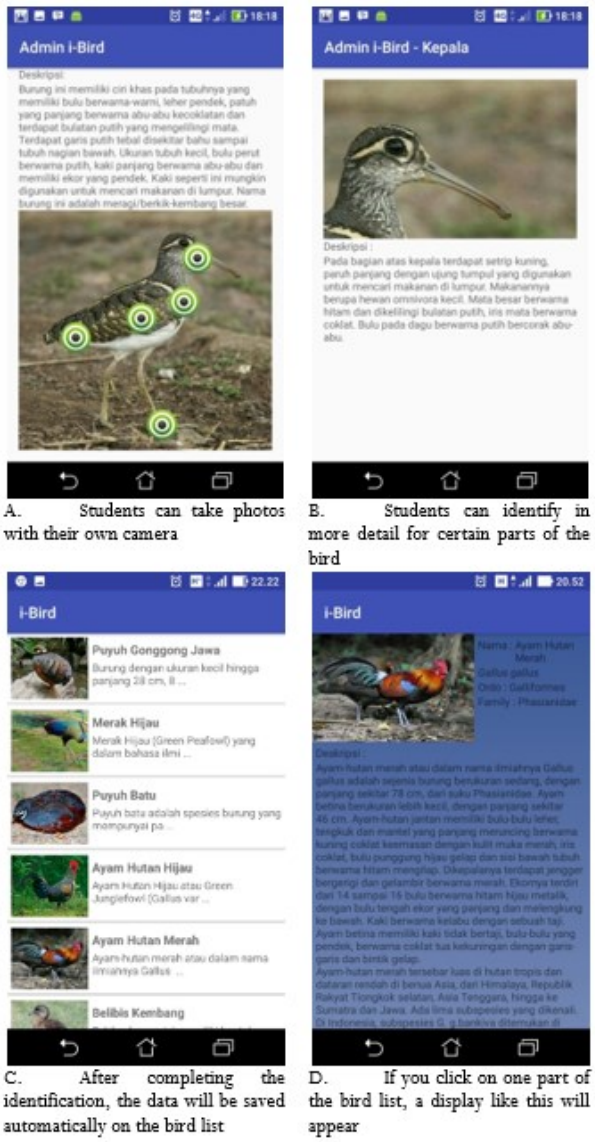
Developing a smartphone application must, of course, be following the platform and have a purpose for what the application made. The i-Bird form in this study, equipped with features that can use to identify particular species of Aves. Class used in Vertebrate Zoology halls. The results show that the i-Bird application can improve student identification skills. There are many ways to improve bird identification skills using various technological applications such as audio signal processing technology and neural networks (Guo & Liu, 2017; Tatar et al., 2023) and acoustic signal processing using audio files from the XENO-CANTO online database (Guo & Liu, 2017).

One of them is using forms contained in smartphones, how we can implement them for identification birds. Smartphones are widely used throughout the world for various things, accessing information needed even for social communication (Al-Awidi & Al-Furaih, 2023). Smartphone designed with the right platform, of course, it will meet the needs of users and provide maximum results. At present many applications are used to support learning by utilizing social media applications such as WhatsApp, Twitter, Line, Facebook, Instagram, and the YouTube application. The results are quite useful to improve learning, even some studies develop smartphone applications in the form of games to support learning (Chapple et al., 2017).

The i-Bird application was design to make it easier. Students can use it in identifying classes. Students can access and create content with the application. The i-Bird application also designed to store data in the form of databases stored on the internet so that this application is online. Following the purpose of this study to develop smart content using smartphone applications, the i-Bird application can at least meet the criteria of smart content, which can be easily accessed, can be used to support learning, can be created by users, provide new experiences in education and can be used at any time (Sinha & Gupta, 2023). Digital features should be able to facilitate users to access the information they need. The features available in smartphones must be able to increase user creativity and can be used to solve problems, especially in learning. Online applications can help students access the content at any time, can also be used for distance learning. Learning at the moment is online, which can involve many parties.

Students, especially prospective biology teachers, possess essential identification capabilities. Identification will be beneficial in learning. Identification skills develop accurate identification skills, compare and connect a phenomenon, find facts and can draw factual conclusions (Melis et al., 2021). Identification skills need to be possessed by every student because it can help them make finding facts easier. Excellent identification skills will encourage someone to have creativity as a particular skill. Identification capabilities cannot change form on their own; of course, they have to go through a part that integrated in a sustainable manner. Identification skills are not easily obtained, must be trained through practice and habituation and pro-

vide intensive experience. Identification is not rigid; much be done to improve this ability with proven and relevant methods. Identification is an ability that must be owned by anyone, beneficial to help conservation and sustainable development efforts.



A. Students can take photos with their own camera

B. Students can identify in more detail for certain parts of the bird

C. After completing the identification, the data will be saved automatically on the bird list

D. If you click on one part of the bird list, a display like this will appear

Figure 4. Student Identification Results Through the i-Bird Application

The i-Bird application is designed to improve student identification skills through field lectures. This application encourages student-centered learning, where students will carry out the identification process through an application that has been installed on their smartphone. Students can take pictures with smartphone cameras (see Figure 4.A.) then students can enter them into the column provided in the application. In this section, students can also briefly describe what they know about the bird. To carry out more detailed identification, students can determine the points (see Figure 4.A) according to which part they want to identify. If one of the dots is clicked (example in Figure 4.B.) the section that they marked earlier will appear, then students can identify in detail and describe the results of the identification briefly in the provided column. If the identification process has been completed, the student presses the finish button on the application, the data will automatically be stored in the bird list database (see Figure 4.C.). The list that appeared earlier is entered into the admin, and the sorting/selection process is carried out by the admin. Selection is made regarding the quality of images and content so that there are no misconceptions. After passing the selection, the meal will appear on the bird list. If you click on one of the bird lists, a complete display with a description will appear (see Figure 4.D).

Identification capabilities can improve by integrating smartphone technology, of course, with a unique design. In this study, identification capabilities increased with smartphone applications. Smartphone applications can use to help identify species; these results can improve student achievement and learning motivation (Karnoe et al., 2019). The increased ability to identify a species leads students to better understand morphology and taxonomy in biology. The bird species identified turned out to have differences in several species that live in that place, so that in sequence the students then better understand biodiversity including genus, family, order, class, subphylum, phylum, kingdom and domain. More than that, understanding biodiversity makes students more concerned about conservation and protection of living creatures and their habitats.

Smartphone applications can use to help train identification skills, mobile apps could help identify developing issues related to the environment as a conservation effort. Based on the results of the interviews, most students were very enthusiastic and showed an interest in learning to use smartphone applications (Suria Martinez, 2023). Students prefer learning with new learning experiences using smartphones. Based on the results of this study, we can assume that advances in information technology, especially smartphones, can integrate into learning (niromand et al., 2024). Thus it is necessary to design and develop a specialized curriculum in which information technology integrated into meeting the 21st-century learning needs, industrial era 4.0 and human society 5.0 (Becker & Blanchette, 2017). With the right program under your needs, it provides effectiveness in learning. Based on the results of the interviews, most students were very enthusiastic and showed an interest in learning to use smartphone applications. Students prefer learning with new learning experiences using smartphones. Of course, a positive thing to develop in the future. The development of content in the application certainly has advantages and disadvantages. The application developed in this study still needs to be developed and refined. The results of this study can use as a reference for developing future lecture programs, of course, in different fields and scope (Ayaz, 2023; Mulyanti et al., 2022). Based on the results of this study, we can assume that advances in information technology, especially smartphones, can integrate into learning. Thus it is necessary to design and develop a specialized curriculum in

which information technology integrated into meeting the 21st-century learning needs, industrial era 4.0 and human society 5.0 (Spicker et al., 2022). With the right program under your needs, it provides effectiveness in learning.

Conclusion

The development of technology must fully utilize in learning to create innovative learning. Innovative learning will increase the effectiveness of learning with maximum results. Smartphone applications can be a good alternative to developed in the learning process. The results of this study provide information that the use of technology is quite effective in improving the learning process. Moreover, students are given the opportunity to engage in recreational activities so they can improve their psychomotor skills. The results showed that the identification ability of students using the i-Bird application increased significantly compared to students using the guidebook. This proves that technology integration in the learning process can help improve learning effectiveness, of course, with the right use. The results of this study are still shortcomings related to the application being developed which is still in the form of a prototype so it really needs improvement can use as a reference for future research.

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