Bird on Your Smartphone: How to make identification faster?

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Abstract. Identification skills of students are needed in the field activities of animal ecology course. Good identification skills will help students to understand the traits, determine differences and similarities in order to naming of birds’ species. This study aims to describe the identification skill of students by using smart phone applications designed in such as a support in the field activities. Research method used was quasi experiment involving 60 students which were divided into two groups, one group that use smartphone applications (SA) and other group using a guidebook (GB). This study was carried out in the classroom and outside (the field). Instruments used in this research included tests and questionnaire. The identification skills were measured by tests, indicated by an average score (AS). The results showed that the identification skills of SA students were higher (AS = 3.12) than those of GB one (AS = 2.91). These results are in accordance with response of students. The most of students (90.08%) mentioned that the use of smart phone applications in identifying birds is helpful, more effective and convenience to make identification faster. For further implementation, however, performance of the smartphone used here need to be enhanced to improve the identification skills of students and for wider use.

1. Introduction

Learning always has a good development of the model or method used of course with the aim to improve the learning process to a better direction. The various learning innovations associated with models, methods and approaches are continuously developed with the aim of creating effective learning. An innovation in learning is of course much needed in supporting a more practical learning process. In general, the learning process is still using traditional methods that are considered quite effective and easy to implement, of course this raises a concern, especially in the shift paradigm of 21st century learning trend that requires a change in learning objectives from teacher center to student center so that learning will be more meaningful [1,2]. The model or method used in learning has an important role in determining the goal to be achieved, a model can function as a conceptual analog delivered schematically in learning [3]. Learning in the classroom should be designed in such a way by a teacher, in other words the teacher must have competence that qualified, careful in reading the situation and conditions and quickly respond to changes that occur in learners. Teachers must have teaching competence, motivate learners, create instructional models, manage classes, communicate, plan learning, and evaluate and develop various components in learning in accordance with the development of science and technology [4].

Technological advances in the 21st century can be felt so rapidly, especially related to smartphone technology. Smartphones evolve with the sophistication of its features are more complete. Various applications can easily be downloaded on available content such as on the Google Play Store or Apps Store. However, the use of advanced features in the smartphone has not been used optimally, especially related to learning. Smartphone applications are mostly used as a means of social interaction, games and entertainment. It would be better if the smartphone application can be used in learning [5,6,7], is used extensively in studying animal ecology especially birds [8,9], and can be integrated into fieldwork activities using mobile apps technology [5,10].
An innovative method or approach is expected to aid learning activities to study animal behavior (Thomas et al., 2016), study and review animal morphology [11,12]. Animal behavior in this case concerns the characteristics of animals, way of life, adaptation, breeding and migration. With the right approach is expected to improve students’ identification ability, especially related to animal ecology course. Smartphone applications in support of learning can also be developed with the aim of improving student identification skills [5,13,14,15,16], besides it can also be developed to improve students’ classification ability [8,9,17]. The development of smartphone applications can be applied to a variety of sciences, one example in animal ecology especially to study bird behavior [5,9,18,19,20,21,22]. A common application used for studying birds is the e-Bird application [20,23,24] used to identify bird migration, patterns Migration and distance migration [18,19,25,26,27,28,29] and bird navigation on the influence of wind speed, altitude, temporal spatial scale and differences temperature [13,20,30,31]. This can be useful as an effort conservation [18,20,32,33,34].

In West Java, there are many interesting potentials that can be targeted to identify species of birds that focus on identification capability. With bird identification capabilities, it is hoped to be one of the guidelines for conservation of birds especially in West Java in the future come. In general, this study aims to develop smartphone applications on field activities in animal ecology lectures to improve students’ identification of bird species. Using smartphone apps is expected to make it easier for students to identify the types of birds they find in the observation location. With the provision of identification capabilities in the future, students are expected to contribute in conservation efforts especially to endemic rare birds of West Java generally to rare animals Indonesia.

2. Methods

2.1. Method and participants
This research used quasi experimental method with quantitative descriptive analysis. The study involved 60 students of animal ecology classes which were divided into two groups (30 students each). The first group (A) was students who used the smartphone application (SA) and the second group (B) were students who used the guidebook (GB). Each group was divided into two small groups. Group A became A1 and B1, and group B was A2 and B2 (see Figure 2 for detail information).

2.2. Research location
This research was conducted in two different places, namely in the class located at Pasundan University of Bandung and outside the class located around the campus Universitas Pendidikan Indonesia (UPI) Bandung precisely around the conservation area of botanical gardens.

A. The location of research conducted in the class
B. Location of field research (botanical garden)

Figure 1. Research sites in two different places in Bandung, West Java: A. Pasundan University; B. UPI, Bandung
Figure 2. Groups of students are divided into groups for each class. Groups A1 and B1 are groups of students using smartphone applications (SA). Groups A2 and B2 are groups of students using guidebooks (GB). Research carried out in the classroom and in the field.

2.3. Smartphone Application (SA) and Guidebook (GB)
The smartphone application was designed and developed with the aim to facilitate students of identifying birds. Prototype was made for Android based smartphone operating system platform. Data was stored in the cloud with a maximum capacity of 2GB. The programming language was used to develop the application using JAVA. Android SDK was used to support smartphone with Android operating system Ice Cream Sandwich up (4.0.3 up). Applications are offline and online. Online, in the early use of the application will download data from cloud storage online and store it in the smartphone and also when the application will update / update the data, the application will download the latest data storage place online. Offline, when the application will display data, the application will retrieve existing data in the smartphone storage media that have been downloaded before. The developed smartphone app contains content about a wide variety of bird species with short descriptions. We named this app with the name Indo Bird.

![Image of smartphone application]

A. Application icon contained in the smartphone
B. We can choose one of the bird icon on the bird list
C. By clicking on one of the bird icons listed in the bird list, a full description will appear

Figure 3. Display prototype in smartphone; A. Icon view; B. Home screen; C. Birds description
Guidebooks were designed and prepared from the various references contained in the internet. The preparation of the guidebook aims to compare students' identification skills using smartphone applications with students using guidebooks.

2.4. Data collection
Data collection was done through tests and questionnaires. The tests were performed twice in each group. The test was done in class and field to identify birds. The test problem was developed based on indicators of identification ability. Questionnaires were given to students to obtain student responses regarding the use of smartphone applications in learning.

2.5. Data analysis
Data was analyzed using t-test. Before the T-test, normality tests were performed using Kolmogolov-Smirnov and homogeneity test using Levene. T-test was performed to see whether there is difference of ability of identification between student using smartphone application (SA) with student using manual (GB).

2.6. Identification skills indicators
Identification skills in this research were used to know the ability of students in identifying birds with the help of smartphone using internet network. In this research, student identification capability was developed covering several indicators as shown in Table 1.

| Identification Skill Indicator | Description |
|-------------------------------|-------------|
| Accuracy                      | Accuracy in this case is intended to be accurate in identifying the morphology of each bird. |
| Correlation                   | The correlation in this case is intended to correlate bird morphology with flying behavior and bird migration patterns. |
| Explanation                   | The explanation in this case is intended to explain the linkage between bird morphology and bird migration and behavior. |
| Formulate the problem          | In this case it is intended to be capable of formulating problems related to morphology associated with bird behavior and migration. |
| Find fact                     | In this case it is intended to capture the facts of identification results related to morphology associated with bird behavior and migration. |
| Conclude                      | The ability to provide conclusions based on the phenomena and findings in the field, these conclusions are important to be used as the basis for making decisions in the future. |

3. Results and discussion
3.1. Identification skills
The ability of student identification was obtained based on several indicators developed in this research. Data were obtained from 60 students divided into two groups of SA (n=30) and GB (n=30).
The result of the average score analysis of the students' identification ability of SA and GB shows the difference of mean score (see Figure 4).

![Figure 4. Average score of student identification skills using smartphone application (SA) and guidebook (GB)](image)

The students' identification ability showed an average score of 3.12 on the maximum score of 4, while the GB student identification ability showed an average score of 2.91 on the maximum score 4. This score was a combined score of the research data conducted in class and field. Based on these results it is clear that SA students' ability is better than the GB student's ability to identify birds. To see whether or not there is a significant difference between SA and GB then proceed with t-test. Before performing t-test in this study determined first test of normality and homogeneity test.

| Test                          | Score | Sig. (0.05) |
|------------------------------|-------|-------------|
| Normality test (Kolmogorov-smirnov) SA | 1.278 | 0.076       |
| Normality test (Kolmogorov-smirnov) GB   | 1.373 | 0.046       |
| Homogeneity test (Levene Statistic)       | 1.889 | 0.99        |
| t-test                                   | 6.495 | 0.000       |

The result showed that data of student identification ability is normal and homogeneous distribution (see Table 2). Furthermore, the result of statistical test by using t-test shows that t\text{count}>t\text{table} (6.495>1.671) or we can see from p-value at significance level 0.005 (0.000 <0.05). It can be concluded that there is a significant difference between the identification ability of SA students and the identification ability of GB students in identifying birds.

### 3.2. Response of students

To complete the research data, the questionnaires were conducted to the students about their responses after following the animal ecology lecture. Students were given a questionnaire of course students involved in this research. We enrolled as many as 39 students who were given a questionnaire to be asked their response about the use of smartphone applications in learning. The questionnaire that we distributed was designed through several questions tailored to the needs of this study. The response of students can be seen in Table 3.
### Table 3. Questionnaire of student responses related to smartphone usage

| Numbr. | Questions                                                                 | Frequency |
|-------|---------------------------------------------------------------------------|-----------|
| 1     | Is the use of smartphone apps helpful enough?                             | Yes: 30   |
|       |                                                                           | No: 9     |
| 2     | Does the smartphone app make it easy for you to identify birds?           | Yes: 39   |
|       |                                                                           | No: 0     |
| 3     | Have you ever used a smartphone app in learning?                          | Yes: 22   |
|       |                                                                           | No: 17    |
| 4     | Do you find it difficult to use smartphone apps?                          | Yes: 3    |
|       |                                                                           | No: 36    |
| 5     | Is using guidebooks more effective than smartphone apps?                  | Yes: 3    |
|       |                                                                           | No: 36    |
| 6     | Is using a guide book more appealing than using a smartphone app?         | Yes: 0    |
|       |                                                                           | No: 39    |
| 7     | Does using a manual provide convenience than a smartphone?                | Yes: 0    |
|       |                                                                           | No: 39    |
| 8     | Smartphone apps help faster for bird identification?                      | Yes: 39   |
|       |                                                                           | No: 0     |
| 9     | Does using a guidebook help you to identify faster?                       | Yes: 2    |
|       |                                                                           | No: 37    |
| 10    | Is the content contained in the smartphone app less complete than the manual? | Yes: 0   |
|       |                                                                           | No: 39    |
| 11    | Are you interested in the use of smartphone applications in field activities? | Yes: 32 |
|       |                                                                           | No: 7     |
| 12    | Does it need to add some features of the smartphone app?                  | Yes: 39   |
|       |                                                                           | No: 0     |
| 13    | Is it important that you use smartphone apps in learning?                 | Yes: 37   |
|       |                                                                           | No: 2     |
| 14    | Does manual use need to be developed instead of smartphone apps?         | Yes: 12   |
|       |                                                                           | No: 27    |
| 15    | In the future, do you prefer to use various smartphone applications in supporting learning? | Yes: 36 |
|       |                                                                           | No: 3     |

Most students are interested in using smartphone apps in learning. They assume that the use of smartphone applications is quite effective compared to guidebooks in learning. From the results of data analysis of student questionnaires showed as many as 90.08% of students feel helped by using smartphone applications, more effective and very easy to use to identify birds quickly. Most students consider the need for the development of some of the features that can be used in a wider learning.

Identification ability is needed for students especially in field animal ecology field activities generally in all disciplines. This identification ability is important to study natural phenomena so that it can be used as a reference in solving problems in the real world. The ability of student identification in identifying birds found in West Java is needed in conservation efforts. This is important as some species of birds are included into red or endangered zones.

One of the efforts that can help in conservation is the field lecture activities. With the activities of field coursework has several advantages compared with the process of learning in the classroom. Fieldwork activities will provide students with different experiences and can directly interact with nature [5,10]. However, in general, field study activities still use the old method without any integration of technology in it. For that we designed a prototype with the help of a smartphone that can be used in supporting learning. We are designers of a smartphone app used to identify birds. We do research by comparing the effectiveness of smartphone apps with guidebooks.

Our results showed that student identification ability using smartphone application (SA) is better than student identification ability using guidebook (GB). This is certainly a breakthrough for us in developing applications on a wider scope. At this time smartphone application can be developed and used in learning [5,6,7], in particular in studying animal ecology [8,9], and can be integrated into fieldwork activities using mobile applications technology [5,10]. This is of course to create innovation in learning. An innovative method or approach is expected to help learning activities to study animal behavior [5]. Smartphone applications in support of learning can also be developed with the aim of improving student identification skills [5,13,14,15,16]. The development of smartphone applications can be applied to a variety of sciences, one example in animal ecology especially to study bird behavior [5,9,18,19,20,21,22].

Advances in smartphone technology we should use especially in learning. Most of the smartphone is only used as a means of communication, social media, game play and entertainment only a small part is used in supporting learning. In this study, we capture student responses related to the use of smart phones in learning. They generally support and show interest in using applications in smartphones. Students feel helpful in studying birds, assuming that the use of smartphone applications...
is more effective than guidebooks. Students also argue that the use of smartphone applications provide convenience and they are looking forward to the development of some disciplines in the future. The results of this study can be used as a reference in the development of lecture programs, especially animal ecology so as to assist in the efforts of animal conservation. The use of smartphone applications also needs to be developed for other content.

4. Conclusion

The rapid advancement of science and technology cannot be denied will affect in all areas including education. In this research, we developed an innovative learning by integrating the progress of smartphone technology, called as Indo Bird. Our results showed that smartphone applications can be used to identify birds quickly. Some students showed interest and mentioned that the use of smartphone applications is very helpful, more effective and can be used to identify birds quickly. For further implementation, smartphone apps need to be developed and upgraded to improve student identification capabilities and for wider use in the future.

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