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WELCOME MESSAGE FROM CONFERENCE CHAIR

We welcome all respected presenters to the 4th International Conference on Learning Innovation and Quality Education (ICLIQE 2020) in Surakarta, Indonesia. A major goal and feature of it is to bring academic scientists, education researchers, teachers, students together to exchange and share their experiences and research results about most aspects of science and social research, and discuss the practical challenges encountered and the solutions adopted.

ICLIQE 2020 this time is carried out online because during the COVID 19 pandemic that is currently sweeping the world, it requires all of us to keep up with the applicable health protocols. However we still believe that you can still get stimulation and quality information related to educational innovations from keynote speakers and invited guests from several countries.

The program consists of invited sessions and discussions with eminent speakers covering a wide range of topics in science and social research. This rich program provides all attendees with the opportunities to meet and interact with one another. We hope that your experience with ICLIQE 2020 has been useful and long lasting. With your support and participation, this conference will continue its success for a long time.

Finally, we have raised the bar by focusing on better quality articles for acceptance to be published in reputable journals. We do hope that participants would understand that publication is a long and tedious process that involves many rounds of reviews and corrections. For these reasons, we hope that participants could assist by putting in more effort to ensure that articles submitted are original, error-free and fulfill the quality standard imposed. So, help us to help you and the others as well, as a delay in submission by some individuals will affect the others as well.

We would like to thank the leaders of Universitas Sebelas Maret, all committees and reviewers. They have worked very hard on reviewing papers and providing valuable suggestions for authors to improve their work. We would also like to thank the external reviewers, who provided extra assistance in the review process, and the authors who contributed their research to the conference.

We hope that all ICLIQE 2020 participants will have a fun scientific gathering in Surakarta. We look forward to seeing you all next year at this conference.

Happy Conferencing

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Development of I-Arthropoda as a Media to Identify Species of Arthropoda

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ABSTRACT

Biology is a branch of science that studies the ins and outs of living things. The object of learning includes all organisms, including invertebrates. Invertebrate animals are animals that do not have a backbone, one of which is Phylum Arthropoda. The process of identifying invertebrates can be carried out using various methods and media. However, there are still many obstacles in the field. Therefore it is necessary to take advantage of Android-based learning media. The research objective was to produce I-Arthropoda media to identify the species of Arthropods of Singokromo Waterfall, Ngliman, Sawahan, Nganjuk Regency, East Java. This research and development method uses the research and development (R&D) development model developed by Sugiyono. The results of the identification of the samples used for the database showed the presence of various Arthropod species in Singokromo Waterfall, namely *Tipula maxima*, *Pieris rapae*, *Eurema blanda*, *Eurema hecabe*, *Junonia iphita*, *Vespa tropica*, *Thyreus nitidulus*, *Apis mellifera*, *Chrysolina coerulans*, *Camponotus pennsylvanicus*, *Crematogaster scutellaris*, *Leiobunum vittatum*, *Pardosa pseudoannulata*, *Orthodera ministralis*. Also, the validation results from the experts averaged 91.5% which indicated that the I-Arthropoda Media was suitable for use in learning. General advice from experts is that you need to add images in the determination key, add an info menu that contains media usage procedures and you need to pay attention to image size so that the application is not heavy when operated. Also, the results of student assessment responses were 86.95% which means the media is feasible. The general suggestion from students is that the arthropod image in the collection menu should be enlarged to make it clearer and more interesting.

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• General and reference~Document types~General conference proceedings

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KEYWORDS

Arthropoda, Media, Identify Species, Phylum Arthropoda

1. Preliminary

Biology is a branch of science that studies the ins and outs of living things. The object of learning includes all organisms, including invertebrates. Invertebrate animals are animals that do not have a backbone, one of which is Phylum Arthropoda. In the STKIP PGRI Nganjuk Science Education Study Program curriculum, learning material for Phylum Arthropoda is given to the Diversity of Living Creatures subject.

The study of this subject covers the characteristics of morphology, anatomy, physiology, habitat, and the role of Phylum Arthropoda in the ecosystem. Furthermore, these characteristics are used as the basis for classification into taxon levels. In this lecture, students are required to be able to classify based on similarities and differences in their characteristics, so that they can compile a classification of the Phylum Arthropoda. Phylum Arthropoda identification can be done by various methods such as (1) comparing the animal with the picture in the description book; (2) direct consultation with experts; (3) using a dichotomous key book/key of determination.

The use of the key of determination can make it easier to identify a species of organism quickly and completely (Jusuf and Azimah, 2015). However, according to facts in the field, the use of the key to determination is still an obstacle. One of them is that it is very rare to find the key to the determination of Phylum Arthropoda in Indonesian.

Understanding the principles of identification of Phylum Arthropoda can be actualized through direct observation of objects so that learning is more contextual. Contextual learning is learning with offerings related to the real world, so that the benefits will be felt, increasing learning motivation, students' thoughts become concrete, the atmosphere becomes conducive, comfortable, and enjoyable (Fathurrohman M, 2015). However, to carry out these activities requires adequate learning media, time, and money (Sugiantari PE, 2016).

The results of the researcher's own experience as well as the lecturer of the Diversity of Living Things in the Science Education Study Program of STKIP PGRI Nganjuk, on the identification of Phylum Arthropoda, students find it difficult to focus attention because the media used are marine books in general and journal articles. This learning resource contains descriptions of the Phylum Arthropoda and the concepts resulting from theoretical research. This fact

shows that student learning motivation and the use of learning media in this subject have not developed optimally.

Based on this, it is necessary to improve the learning process for the identification of Phylum Arthropods. One of the efforts that can be done is to utilize innovative and contextual learning media that can improve the learning process of Phylum Arthropoda. This innovative media is a medium for identifying species of Phylum Arthropoda by utilizing an Android-based smartphone device with research material around the student environment.

The use of contextual learning media, especially using digital media, aims to maximize students' understanding of the material, foster interest and motivation of students (Nurhidin Edi, 2017). Referring to this, it is necessary to research Phylum Arthropoda in Singokromo Waterfall, Ngliman, Sawahan, Nganjuk Regency, East Java in developing this material/media database. This location is thought to have a high diversity of Phylum Arthropoda. Also, the results of this inventory are used as an effort to complement the distribution database for Phylum Arthropoda in Indonesia.

2. Research Methods

The development of I-Arthropoda based on android uses the research and development (R&D) development model developed by Sugiyono (2011: 409). Of the 10 research steps, this study stopped at the seventh stage, namely product revision. Broadly speaking, the stages of the research are described as follows.

2.1. Potentials and Problems

At this stage, an analysis is carried out in advance of what media is needed and the basic reasons why this media is needed so that the goal can meet the expected needs. This activity can be done by observing the learning process in the subject of Diversity of Living Things in the Science Education Study Program of STKIP PGRI Nganjuk.

2.2. Data Collection

At this stage, it was carried out to obtain a database on the I-Arthropoda media. The way to get a database on the media is to conduct inventory research of Arthropods in Singokromo Waterfall, Ngliman, Sawahan, Nganjuk Regency, East Java. Sampling was carried out by free collection (Agus et al, 2008), namely taking all live samples found throughout the study location. This is done by dismantling stones, weathered tree trunks, and digging up sand. Then the sample is poured into a plastic tray and separated between the specimen with litter and stones. Samples were taken using tweezers and put in glass bottles filled with 70% alcohol solution for the pickling process. After that, all samples were taken to the laboratory of the Science Education Study Program STKIP PGRI Nganjuk to be identified

2.3. Product Design

At this stage, namely developing draft media or storyboard media. The product produced in this study was I-Arthropoda. The product design is developed based on a needs analysis of data collection.

2.4. Design Validation

At this stage, it was carried out by presenting several experts including media experts and material experts to assess the designed media. Each expert is asked to assess the design so that further weaknesses and strengths can be found.

2.5. Design Revision

After the media has been validated through discussions with experts, the weaknesses can be identified. Then try to reduce these weaknesses by improving the design.

2.6. Product Trials

The test was conducted on a small scale by involving students of the STKIP PGRI Nganjuk Science Education Study Program. Students who are involved are based on student abilities, namely students who have high, medium, and low achievement levels. The reason for sorting out students with different abilities is to find out the media assessment of each student's view so that the validity of the data generated in small groups can be accounted for. At this stage, students are asked to identify Arthropod samples from the Singokromo waterfall using the I-Arthropoda media. Then after implementation, students are given a questionnaire to find out the student's response to the media.

2.7. Product Revisions

After conducting the main test and the weaknesses of the media were identified, the next step was to revise the media and perfect the media. Due to the limitations of researchers, this research method only reaches this stage. Meanwhile, the next stage can be used as future research.

3. Discussion

3.1. Potentials and Problems

The results of the researcher's own experience as well as the lecturer of the diversity of living things in the Science Education Study Program of STKIP PGRI Nganjuk, the identification of Phylum Arthropoda for students is difficult to focus attention because the media used are marine books in general and journal articles. Based on this, it is necessary to improve the learning process for the identification of Phylum Arthropoda. One of the efforts that can be done is to utilize innovative and contextual learning media, namely by utilizing an Android-based smartphone device with research material around the student environment.

3.2. Data Collection

At this stage, it was carried out to obtain a database on I-Arthropoda media. The results of sample identification used for the database showed the presence of various species of Arthropods in Singokromo Waterfall, namely 14 species, consisting of 8 orders

Development of I-Arthropoda as a Media to Identify Species of Arthropoda

and 10 families. The results of the identification of Arthropods at Singokromo Waterfall can be seen in Table 1.

Table 1. Results of the Identification of Arthropods at Singokromo Waterfall

Order	Family	Genus	Species
Diptera	Tipulidae	<i>Tipula</i>	<i>Tipula maxima</i> (Poda, 1761)
Lepidoptera	Pieridae	<i>Pieris</i>	<i>Pieris rapae</i> (Linnaeus, 1758)
		<i>Eurema</i>	<i>Eurema blanda</i> (Boisduval, 1836)
		<i>Eurema</i>	<i>Eurema hecabe</i> (Linnaeus, 1758)
Hymenoptera	Nymphalidae	<i>Junonia</i>	<i>Junonia iphita</i> (Cramer 1782)
	Vespididae	<i>Vespa</i>	<i>Vespa tropica</i> (Linnaeus, 1758)
	Apidae	<i>Thyreus</i>	<i>Thyreus nitidulus</i> (Fabricius, 1804)
<i>Apis</i>		<i>Apis mellifera</i> (Linnaeus, 1758)	
Hymenoptera	Formicidae	<i>Campotonotus</i>	<i>pennsylvanicus</i> (De Geer, 1773)
		<i>Crema</i>	<i>crematogaster</i>
		<i>togaster</i>	<i>scutellaris</i> (Olivier, 1792)
Coleoptera	Chrysomelidae	<i>Chrysolina</i>	<i>coerulans</i> (Scriba, 1791)
Opiliones	Sclerosomatidae	<i>Leiobunum</i>	<i>vittatum</i> (Say, 1821)
Araneae	Lycosidae	<i>Pardosa</i>	<i>pseudoannulata</i> (Bösenberg & Strand, 1906)
		<i>Pardosa</i>	<i>pseudoannulata</i> (Bösenberg & Strand, 1906)
Mantodea	Mantidae	<i>Orthoder</i>	<i>ministralis</i> (Fabricius, 1775)

3.3. Product Design

The product produced in this study was I-Arthropoda. The product design is developed as follows. The collection menu contains images and descriptions of arthropods so that users can compare the animals to be identified with the images in I-Arthropoda. The determination key menu contains instructions that can be used to determine the species of arthropod. On the camera menu, users can use the capture button to photograph the animal to be identified. Then the system in the I-Arthropoda application will look for images that are similar to the animals being photographed.

3.4. Design Validation

At this stage, the score of the validation results from the experts is generated. The score of the results of the material expert validation is 95%, which means that the material is suitable for use in learning but requires a little revision. While the suggestion is that you need to add a little image in the determination key so that it is more

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complete. The results of the material expert's validation of the media can be seen in Table 2.

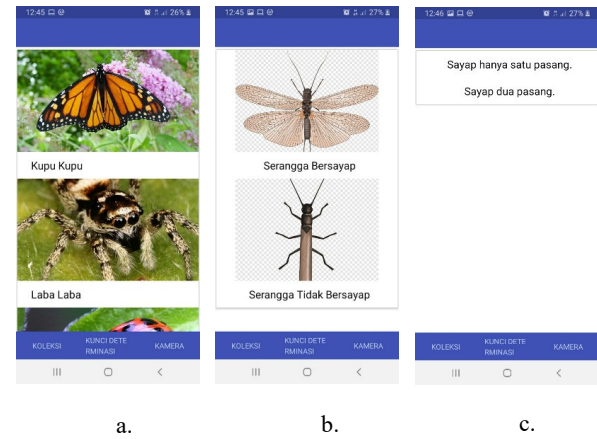


Figure 1. I-Arthropoda Product Design (a) collection menu; (b) the key menu of determination; (c) examples of questions on the key of determination

Table 2 Total Results of Material Expert Validation Against the Material

No	Aspect	Percentage	Category
1	Curriculum suitability	100%	Well worth it
2	Conformity for purpose	88%	Well worth it
3	Material truth	88%	Well worth it
4	Correct identification technique	88%	Well worth it
5	Use of images	100%	Well worth it
6	Use of language	100%	Well worth it
7	The suitability of the material with the development of student cognition	100%	Well worth it
Average		95%	Well worth it

The score for the validation of the media expert is 88%, which means that the media is suitable for use in learning but requires a little revision, while the suggestion is to add an info menu containing procedures for using media and to pay attention to the size of the image so that the application is not heavy when it is operated. The total results of the media expert's validation on the media are in Table 3.

Table 3. Validation Results of Media Experts Against Media

No.	Aspect	Percentage	Category
1	Main page design	83%	Well worth it
2	Use of letters / words / sentences	94%	Well worth it
3	Effectiveness	88%	Well worth it
4	Attractiveness	75%	Well worth it
5	Efficiency	100%	Well worth it

6	Interactivity	88%	Well worth it
	Average	88%	Well worth it

Based on the average results of the experts' assessment, namely 91.5%, which indicates that the I-Arthropoda Media is suitable for use in learning. While the general suggestion is that it is necessary to add an image in the determination key, add an info menu that contains procedures for using media, and pay attention to the size of the image so that the application is not heavy when it is operated. The feasibility of this media certainly cannot be separated from suggestions and input by experts. I-Arthropoda, which is a mobile learning application in this study, is also a cheap and effective learning medium. Also, mobile learning applications can transmit messages in the form of subject matter (Ibrahim, 2003). Research conducted by researchers is also in line with several previous studies.

3.5. Design Revision

At this stage, the main product improvements are produced. The material improvement in terms of material has Added an image in the determination key menu so that it is more complete. Meanwhile, in terms of media, and the info menu is added which contains instructions or instructions for using the media and the morphological structure of the arthropods. Good and clear instructions will be able to influence self-control strategies (Dwintasari Y, 2019) so it is hoped that this information menu can make it easier for students to use I-Arthropoda.

3.6. Test the product

At this stage, the response score of STKIP PGRI Nganjuk science education students to the media is 86.95%, which means the media is feasible and can be used in learning but requires a little revision. The total results of student responses to the media are in Table 3.

Table 3. Total Results of Student Responses to Media

No.	Aspect	Percentage	Category
1	Attractiveness	87.7%	Well worth it
2	Clarity of presentation of material	86.3%	Well worth it
3	Efficiency	84.4%	worth it
4	Interactivity	89.4%	worth it
	Average	86.95%	Well worth it

Student comments on the media are generally interesting and very helpful in identifying species of Arthropods. However, some things need to be improved, such as the image in the collection menu is enlarged to make it clearer and more interesting, the description of Arthropoda species can be reproduced, and it is necessary to consider using image quality so that Arthropod media can be accessed more quickly.

3.7. Product Revisions

At this stage, the resulting operational product improvement is to add the size of the image to the collection menu to make it easier

for students to compare the image with the animal to be identified. The use of images can improve a person's memory retention (Ulfa DM, 2017). Also, the use of android-based media can increase student motivation (Widiensyah, 2018). Meanwhile, the speed of access to media use for each student is different, depending on the connection used by the student because this media is online.

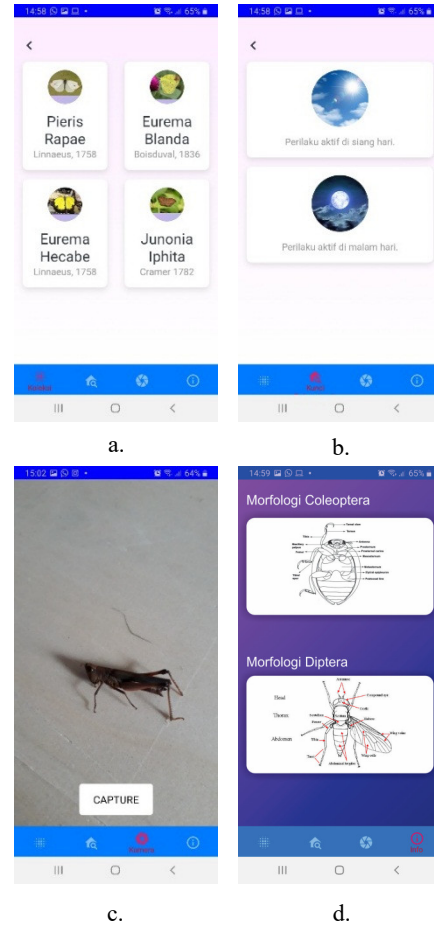


Figure 2. Main product improvement results (a) collection menu; (b) the key menu of determination; (c) photo menu; (d) info menu

4. Conclusion

The results of the identification of the samples used for the database showed the presence of various Arthropod species in Singokromo Waterfall, namely *Tipula maxima*, *Pieris rapae*, *Eurema blanda*, *Eurema hecabe*, *Junonia iphita*, *Vespa tropica*, *Thyreus nitidulus*, *Apis mellifera*, *Chrysolina coeruleans*, *Camponotus pennsylvanicus*, *Crematogaster scutellaris*, *Leiobunum vittatum*, *Pardosa pseudoannulata*, *Orthodera ministralis*. Also, the validation results from the experts averaged 91.5% which indicated that the I-Arthropoda Media was suitable for use in learning. General advice from experts is that you need to add images in the determination key, add an info menu that contains media usage procedures and you need to pay attention to image size so that the application is not heavy when operated. Also, the results of student assessment responses were 86.95% which means the media is feasible. The

Development of I-Arthropoda as a Media to Identify Species of Arthropoda

general suggestion from students is that the arthropod image in the collection menu should be enlarged to make it clearer and more interesting.

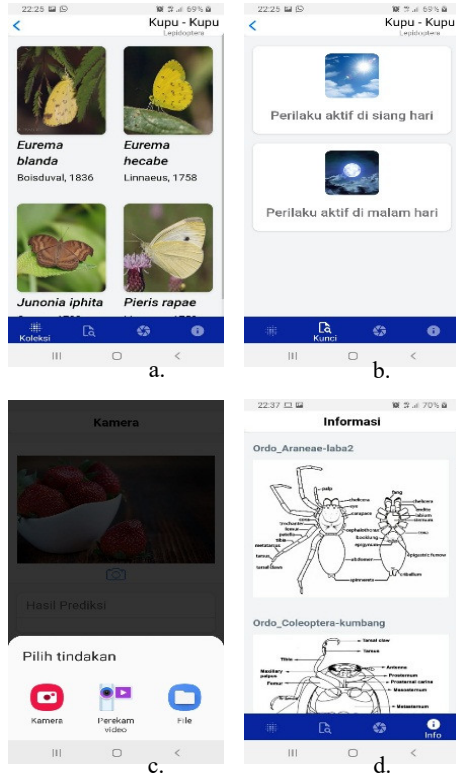


Figure 3. Main product improvement results (a) collection menu; (b) the key menu of determination; (c) photo menu; (d) info menu

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ABSTRACT


Biology is a branch of science that studies the ins and outs of living things. The object of learning includes all organisms, including invertebrates. Invertebrate animals are animals that do not have a backbone, one of which is Phylum Arthropoda. The process of identifying invertebrates can be carried out using various methods and media. However, there are still many obstacles in the field. Therefore it is necessary to take advantage of Android-based learning media. The research objective was to produce I-Arthropoda media to identify the species of Arthropods of Singokromo Waterfall, Ngliman, Sawahan, Nganjuk Regency, East Java. This research and development method uses the research and development (R&D) development model developed by Sugiyono. The results of the identification of the samples used for the database showed the presence of various Arthropod species in Singokromo Waterfall, namely *Tipula maxima*, *Pieris rapae*, *Eurema blanda*, *Eurema hecabe*, *Junonia iphita*, *Vespa tropica*, *Thyreus nitidulus*, *Apis mellifera*, *Chrysolina coerulans*, *Camponotus pennsylvanicus*, *Crematogaster scutellaris*, *Leiobunum vittatum*, *Pardosa pseudoannulata*, *Orthodera ministralis*. Also, the validation results from the experts averaged 91.5% which indicated that the I-Arthropoda Media was suitable for use in learning. General advice from experts is that you need to add images in the determination key, add an info menu that contains media usage procedures and you need to pay attention to image size so that the application is not heavy when operated. Also, the results of student assessment responses were 86.95% which means the media is feasible. The general suggestion


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