Research Article

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Plant identification code: Learning media based on qr-code for plant exploration in P-WEC conservation area

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Article Information	ABSTRACT
	Petungsewu Wildlife Conservation (P-WEC) is an informal education center on nature and wildlife conservation who has many wild plants to learn, but learning related to plants in the area is still not optimal due to the lack of tools that make it easier for visitors to learn plant exploration, also learning by biology students and visitors still not optimal because learning is still centered on the drawing sheet presented plants, so that independent exploration has not been widely carried out, so this research aims to determine the feasibility of the PIC (Plant Identification Code) as a learning media based on qr-code for plant exploration in P-WEC Conservation area. This research was used Research and Development (R&D) with ADDIE model which includes the analysis, design, development, implementation and evaluation stage. The data were collected using a questionnaire to measure the feasibility of media by media and material expert, and also visitor who are visitors who are biology students. The result showed that PIC Media are feasible to use with score of 4.10 and 3.85 (feasible) according to media and material experts, and also score of 4.22 (very feasible) according to the visitors who is Biology students. It is because the media can increase the efficiency in the learning environment where information related to plants can be accessed independently by students using a scanner application on android during exploration and plant identification learning in the P-WEC conservation area. **Keywords:** Learning media; plant identification; P-WEC conservation; qr-code
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INTRODUCTION

Today, learning is no longer centred on the classroom, but also on the entire environment around students. The relationship between learning that takes place in the surrounding natural environment will

provide a variety of learning processes and outcomes that can have a positive impact (Rebbeca, 2016). Likewise, in current learning programs in Indonesia, the "Pembelajaran Merdeka" program provides the essence of freedom for institutions and students, where learning is now not only about remembering the information provided but also providing a direct experience so that students can analyze, solve a problem and innovate according to their needs with the surrounding environment (Sibagariang et al., 2021). Learning Biology can emphasise direct experience in the environment in developing competencies to explore and understand the natural surroundings scientifically, this interaction will be more successful if the object being studied is a real object in the surrounding environment (Wibowo, 2019; Hammond et al., 2020).

One of the suitable learning areas for studying Biology is the P-WEC (Petungsewu Wildlife Education Center) conservation area, located in the Jl. Wildlife 1, Petungsewu Village, Kec. Dau, Malang Regency. P-WEC is an informal education centred on nature and wildlife conservation which was established in 2003 with the educational method used is experiential learning through an adventure and game approach. In practice, nature is used as a learning medium, most of the learning time is spent in nature, so this area is suitable for carrying out the Biology learning process for students (Petungsewu Wildlife Education Center (P-WEC), 2021). However, based on observations and interviews conducted by P-WEC, there are several obstacles in studying wild plants, some of them are: (1) the plant information board only listed the names of existing plants; (2) there are still some plants that do not have information boards so that information is not available in them; (3) some of the information boards presented are easily damaged, especially during the rainy season; (4) some students sometimes have difficulty studying the variety of plants when exploring because there is not much information presented. Documentation of observations as shown in Figure 1.

Figure 1. (a) Handwritten Plant Information Board; (b) Students Learning through Plant Drawing Sheets (Source: Personal Documentation, 2022)

Based on these constraints, a media that facilitates learning is needed to make it easier for students to study plants in the P-WEC area. The lack of available information related to plants in the P-WEC area certainly makes it difficult for students because not all Biology students know information related to these plants. So one of the learning media that can be used is PIC (Plant Identification Code) media, which is a QR Code-based media that can store information data in the form of symbols marking real objects made of black and white bar patterns that are easily recognized by computers/ androids

through a scan code application (Wijaya & Gunawan, 2016). Based on research by Wulandari et al., (2019), QR is able to support the learning of orchid species, through an android-based application for identify the type of orchid plant using a QR Code Scanner using System Development Life Cycle (SDLC) so that the orchid plant identification information system uses QR Code Scanner successfully implemented QR Code itself has advantages such as being a reader that contains information with direct access so that students will find it very easy to obtain information only through scanning from camera phones or the QR Code Generator application (Mawaddah et al., 2016).

Research by Foster (2014) showed that learning by using QR Codes on mobile phones is able to effectively motivate student learning regarding flora and fauna in nature because it contains information related to certain species by integrating the environment with digital. So to overcome these obstacles, it is necessary to develop learning media that can provide information related to plants for Biology students through QR Code-based PIC (Plant Identification Code) media in the P-WEC conservation area. This selection is due to the advantages of four factors such as the speed and the efficiency of the application in providing data exactly in accordance with the user command, productivity and creativity, and also flexibility (Said et al., 2018). Also using QR Code has advantages which can increase efficiency in the learning environment because it prevents biology students from wasting time on search engines and being exposed to irrelevant information, while also being able to be accessed by mobile devices through scanner applications (Rawashdeh et al., 2021). The integration between media and environment can become a positive source of information because students can observe and prove the information presented in the application with real plants, especially when learning about Plant Morphology or Identification of Phanerogams and Cryptogams (Aldya & Arifendi, 2021). Then based on the description above this research aims to determine the feasibility of the PIC (Plant Identification Code) based on QR-Code learning media for plant identification in P-Wec conservation area

RESEARCH METHODS

This research is Research and Development (R&D), with ADDIE methods from Dick and Carey (Sabri & Abdul, 2020), consist of analysis, design, development, implementation, and evaluation. The using of ADDIE because this methods can help manufacturing products in physical or non-physical forms, to produce a particular product and test the effectiveness of the product (Ranuharja et al., 2021). Start with the analysis stage, by identifying the needs that needed in the P-WEC conservation area to make it easier for Biology students to other visitors to study existing plants, so that the area functions optimally in learning outside the school area. Then at the design stage, instructions will be made to minimize obstacles at the analysis stage by designing PIC media that can really effectively facilitate learning and also related to the condition of the P-WEC conservation area.

In the development stage, an instructional design was developed based on QR-Code that has been integrated with technology and can be accessed using a scanner application by students in the P-WEC conservation area. At the implementation stage, a small- scale trial was carried out by validating the product by media expert validators through an assessment of the feasibility aspect of appearance, media and content, then continued with material experts through an assessment of the aspects of content feasibility, presentation of material, and readability, as well as visitors, which is consist of 20 Biology students, who conduct learning activities in the P-WEC conservation area by assessing the relevance and accuracy of the material, the feasibility of presenting the material using likert scale with a score range of 1.00-5.00 from the highest to lower score (Wiratomo et al., 2020), the appropriateness of the display, the use of media and the use of language.

FINDING AND DISCUSSION

The ADDIE model starts with the first phase by to identify, consider and determine the needs needed in the P-WEC conservation area to help make it easier for Biology students and other visitors to study existing plants. From observation and interviews, some of the findings found indicate that: (1) there are still many plants in the conservation area that do not yet have information boards because the materials used previously were not durable and easily damaged; (2) some information boards that exist in plants are still limited to handwritten Latin names and local names; (3) there is no database related to information from these plants that can be accessed for learning in conservation areas so that learning is limited; (4) learning carried out by biology students and visitors is still not optimal because learning is still centered on the plant picture sheets presented, so independent exploration has not been wid ely carried out. This condition can be overcome by designing QR Code-based PIC media to meet all the needs needed during learning for Biology students in the P-WEC conservation area, where the PIC media will be in the form of plant information boards that are directly connected to a database of information related to these plants that can be accessed independently by scanning the QR-Code through their respective androids by students who are studying biology with exploration in the P-WEC conservation area. Then, in the development stage, it uses the validity of the expert judgment on the material and media aspects. The result show an average rating with a score range of 1.00-5.00 obtained value from media experts with a score of 4.10; while from material expert with a score of 3.85, all in the category "feasible". The criteria of validity of this android-based are shown in Table 1 and Table 2 below.

Table 1. The Validity of PIC Media by Media Expert

No	Aspect	Score	Category
	Aspect of display feasibility		
1	Display quality	4.00	Feasible
2	Design quality	4.50	Very feasible
	Aspect of media and content		
3	Serving proportion	4.00	Feasible
4	Media effectiveness	4.00	Feasible
5	Language usage	4.00	Feasible
	Average	4.10	Feasible

Table 2. The Validity of PIC Media by Material Expert

No	Aspect	Score	Category
	Aspect of content feasibility		
1	Compability of material with courses	3.71	Feasible
2	Material accuracy	3.80	Feasible
3	Material update	4.00	Feasible
	Aspect of material presentation feasibility		
4	Presentation technique	4.00	Feasible
5	Learning supporting aspects	3.67	Feasible
	Aspect of readability eligibility		
6	Compability with student developement	4.00	Feasible
7	Communicative	3.67	Feasible
8	Conformity with the rules	4.00	Feasible
	Average	3.85	Feasible

In the implementation stage, small scale of test also occur consist of 20 biology students who attempt to learn in P-WEC Conservation about plants generally in plant morphology courses as well as identification in Phanerogams and Cryptogams courses, by using the questionnaire the result shows

that the score is 4.22 which mean the application is very feasible to use. The criteria of validity of this android- based are shown in Table 3 below:

Table 3. The Validity of PIC Media by Biology Students

No	Aspect	Score	Category
1.	Material relevance and aaccuracy	4.23	Very feasible
2.	Eligibility of presentation of material	4.33	Very feasible
3.	Display eligibility	4.34	Very feasible
4.	Media usage	3.08	Feasible
5.	Language usage	4.16	Feasible
	Average	4.22	Very feasible

The participation and involvement of students directly with their environment will help students to construct knowledge with their experiences in a real learning environment as a relevant self-research process. In addition to the real environment, learning by utilizing technology can of course also provide benefits for students, where the use of technology is able to provide visualization in the form of text, images and interactive graphics that can facilitate access for students to study independently and repeat learning that is difficult to understand (Wahyuni, 2018). It also shows that the PIC media based on QR-Code has several benefits which is can bring about integration between environment, technology and biology learning for students, where this media was developed by identifying plants in the P-WEC conservation area, especially in the arboretum area which is usually used for learning for students and other visitors. This media was developed as a too l especially for Biology students when participating in learning related to plant exploration in the learning process. The development of this media begins with the lack of information in the area because it is only about the names of plants, even though in studying plants, detailed information about these plants is needed to help students identify them. Ben et al., (2019) stated that in studying and exploring plants, image-based methods are considered promising and make it easier to study a plant species, especially when using a mobile device and analyzing it with an application-installed recognition to identify a species. So for this exploration, QR-Code-based PIC media was developed to make it easier for students and visitors to access information related to the desired plants. This PIC media made of mica plate with a size of 5x15.5 so that it can withstand all weather, then the barcode can be accessed using a scanner application where it will go directly to the website which contains information sheets containing classification data plants, descriptions, cultivation and benefits that can be accessed by students at P-WEC conservation area which will later become a plant information database, that can be shown in Figure 2 below:

Figure 2. The Use of PIC Media Based on QR-Code Using Scanner App (Source: Personal Documentation, 2022)

The use of QR-Code is also able to increase efficiency in the learning environment because it prevents students from wasting time on search engines and being exposed to irrelevant information, besides that, easy access is also offered because the QR-Code can be accessed by students' mobile devices through a scanner application so that allows students to access more information more easily and has the potential to increase student learning potential (Musthofa, 2016; Ucak, 2019). The use of QR Codes is also able to facilitate student learning, where in their research the majority of students think that the use of QR Codes in learning medicinal plants is easy to employ, this is because most of the respondents stated that they are interested in this learning system so that it can have a positive impact on students. In addition, the integration of the learning experience with smartphones in accessing the QR-Code provides flexibility and valid information to students due to a direct process in accessing information that downloads valid information with the material being studied in detail (Zakaria et al., 2019; Kharir, 2020). The display of PIC Media based on QR-Code can be shown in Figure 3 and the database of P-Wec plants can be shown in Figure 4 below:

Figure 3. Display of PIC Media Based on QR-Code (Source: Personal documentation, 2022)

Figure 4. Database of P-WEC Plants that can be Scanned using PIC Media Based on QR-Code (Source: Personal Documentation, 2022)

This PIC media based on QR-Code is very helpful because it uses plants around the P-WEC Conservation as a source of information so that students can observe and prove the informationpresented in the application with real plants. It also helpful because the visualization can help students to understand simple to complex concepts. The development of information and communication technology is able to support the teaching and learning process of biology by utilizing simulation and visualization to build visuals, representations and problem solving for students (Patil, 2020), so learning about identifying plants can be easier to conducted.

CONCLUSION

The development of QR-Code-based PIC media is suitable for use in plant exploration carried out in the P-WEC conservation area. The assessment is carried out based on media experts by P-WECteam, and material experts by Biology Education lecturers with score of 4.10 and 3.85 with feasible category and and also by Biology students who have carried out plant exploration practicum in the P-WEC Conservation area with score of 4.22 with very feasible category. Based on the media assessment, the development of QR-Code-based PIC media can be used because it has several benefits including being able to increase efficiency in the learning environment because it prevents biology students from wasting time on search engines and being exposed to irrelevant information, besides being able to be accessed by mobile devices for all plants in the P-WEC conservation arboretum area where information related to plants can be accessed independently by students using a scanner application on android during exploration and plant identification learning in the P-WEC conservation area.

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