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Student responses in environmental education using information technology at the Purwodadi Botanical Garden

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Abstract. Purwodadi Botanical Garden is an ex-situ plant conservation institution, as a conservation institution, one of the activities of Purwodadi Botanical Garden is environmental education. Increasing student visits and decreasing environmental education guides are problems that are being faced, therefore the use of information technology needs to be utilized to overcome these problems. The purpose of this study was to evaluate the pre-use of information technology in environmental education. Evaluation is aimed at elementary school students, junior high school, and high school. This study used a survey method with a questionnaire. The focus of the questionnaire is on the ease, interest, and adequacy of the information presented. Data analysis was performed using the descriptive analysis method with the division according to respondent education levels. Results of the analysis of the use of information technology in the Purwodadi Botanical Gardens show that at the primary school level, 49% are very satisfied, 44% are satisfied. at the secondary school level 30% are very satisfied, 58% are satisfied. at the high school level 39% are very satisfied, 56% are satisfied. From the results of research, the use of information technology for environmental education can be well received by students and can be immediately implemented.

1. Introduction

Puwodadi Botanical Garden is an ex-situ plant conservation institution located in East Java. Purwodadi Botanical Gardens is currently under the management of the Indonesian Institute of Sciences. According to Presidential Regulation No. 93 of 2011 concerning plantations, the duties of a botanical garden include, among others, plant conservation, research, education, and environmental services [1]. Education is one of the tasks carried out by Purwodadi botanical gardens, Purwodadi Botanical Gardens seeks to make the implementation of these tasks effectively. In 2017 Purwodadi Botanical Garden developed an activity called the Good Education (GE) Program [2]. Human resources are an important factor in the Purwodadi botanical garden's educational activities, but currently, the number of human resources serving as educational guides is very limited. Efforts to improve services in environmental education are needed. The use of information technology was chosen to help improve services in the delivery of environmental education information.

Information media can be defined as the collection and rearrangement of information so that it becomes useful material for recipients of the information. Delivery to learners can be in the form of

tools, materials, and people [6]. Information media composed of graphic, photographic or electronic devices used to capture, process, and rearrange information visually. In order for information media to be useful and well-targeted, the types of information media must be useful to recipients of information [7].

Some information media are available at the Botanical Gardens of Purwodadi. one of them is an orientation map near the entrance, information boards at the Purwodadi Botanical Garden on the main road, a signboard in each collection, and an interpretation board located in each collection block. At present, there is also a Botanical Garden Information Building, which is a room with several displays describing the activities carried out by the Purwodadi Botanical Garden. It is expected that with this information media can support environmental education activities carried out by BKT Kebun Raya Purwodadi [8].

Information media is needed to interact with visitors. According to the definition of interaction is a relationship is something that takes action, interacts or influence each other Human and computer interactions have also been long studied as part of a scientific discipline. In this case, the role of interaction is intended to produce systems that are easy to use, safe, effective, and quite efficient in relationships. In human and computer interaction has three main components, namely the system user, the interaction model, and the system that will be used [9].

QR Codes have selected information technology interaction media, where QR Codes are two-dimensional black-and-white barcodes that were originally introduced by Denso Corporation of Japan in 1994. QR Codes consist of two-dimensional matrices arranged into a series in square patterns [10]. QR Codes began to be widely applied in massive product marketing in the early 1990s and were used to increase interactions with consumers [11]. One of the researches is the application of technology QR Codes in the field of tourism. QR Codes are used to send information digitally to visitors. The results showed that the effectiveness of the use of QR Codes technology in young museum visitors [5]. The print media industry, technology QR Codes are used to enrich the content of these media to connect with multimedia content. This is done to maintain relationships with readers who have switched to digital media a lot, this was done in Kompas newspaper [3]. In the field of education technology, QR Codes are packaged to connect students with interesting audiovisual material. Previous research states that QR Codes are applied to education outside the classroom, and from the application QR Codes can be well received and can be used as a medium of education in the future [4]. Based on previous research, it is not impossible that information technology can be applied to environmental education activities in the Purwodadi Botanical Garden.

Surveys are generally limited to research where data is collected in part from a population or commonly called a sample, it is used to represent the entire population. [12]. The purpose of a survey of users is to determine preferences for digital technology applied according to the user. Surveys are used to learn the user's preference on a product [13]. In other studies, surveys are also used to measure the level of user satisfaction with a service [14]. This study aims to determine student responses to the use of information technology media as a medium of interaction in environmental education. Research focuses on ease of use of technology, willingness to use technology, and adequacy of information provided. This research used survey methods and descriptive analysis

2. Methodology
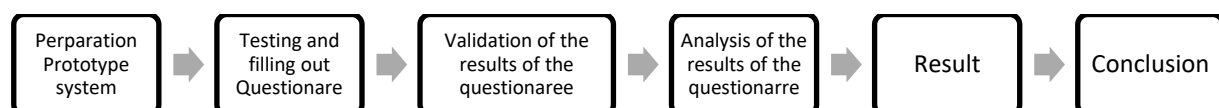The stages that will be carried out in this study are as in figure 1.

Figure 1. Methodology.

2.1. Preparation of system prototypes

The concept used, QR Codes as media interaction information technology will be installed on the collection tree. The QR Codes will be connected to the collection information database system they have information data will be displayed on the user's device, as shown in figure 2.

Figure 2. The concept of applying QR Codes.

2.2. Testing and filling questionnaire

Students will be directed to test the system. After conducting the test students are asked to fill in the questionnaire as shown in figure 3. The questionnaire was arranged simply so that it could be understood by students. The questionnaire uses a Likert scale of 1-5. Questions to be asked are as follows:

Q1: Is it Easy to use? ; Q2: Are you interested in using?; Q3: Is the information obtained as needed?

Purwodadi Botanical Garden Interaction Media Questionnaire				
Age :				
Gender: Male / Female				
Education :				
Elemantary	Junior high school		High School	
Is it easy to use?				
Very satisfied	Satisfied	Neutral	Unsatisfied	Very Unsatisfied
Are you interested in using?				
Very satisfied	Satisfied	Neutral	Unsatisfied	Very Unsatisfied
Does it meet the information you need?				
Very satisfied	Satisfied	Neutral	Unsatisfied	Very Unsatisfied

Figure 3. Questionnaire form design.

2.3. Validation result

A validity test is used to measure the validity of the questionnaire, if the questionnaire is valid, then the statement on the questionnaire can be used to express something that will be measured [15]. While the reliability test is used to show whether the measuring instrument can be trusted [12].

The validity test will be calculated using SPSS 16 software, using Pearson bivariate correlation. The Reliability Test will also be calculated using SPSS 16 software. With this software, we will get the Cronch Bach alpha value, and the data will be declared reliable if the Cronbach Alpha value is greater than the r table value.

2.4. Analysis, results, and conclusion

After the questionnaire data is declared valid and reliable, then a descriptive analysis is performed. The analysis was carried out based on the demographic level of education. This step tries to draw conclusions from the results of the data analysis done.

3. Result and discussion

3.1. Preparation of system prototypes

Based on the concept shown in figure 2. QR Codes as media interaction are prepared at several points in the plant collection. This point will be used in student trials. Example QR Codes of plant collections used are as shown in figure 4.

From the QR Code scan results, it will display the scientific name, area name, origin, characteristics, and benefits. In addition to this information, photos from the plant collection are also displayed. The information obtained will be displayed in the browser on the user's device. An overview of the information display as in figure 5.

Figure 4. QR codes plant collection.

Figure 5. Display collection information.

3.2. Testing and filling questionnaire

Respondents involved were elementary school students, junior high school, and senior high school. The school involved was a school that had used environmental education scouting services at the Purwodadi Botanical Garden. The list of schools that are respondents is mentioned in table 1. The questionnaire was filled in from April 2020 to May 2020.

Table 1. List of respondents.

School level	School name
Elementary school	SDN Model Malang City
Junior high school	SMPIT Al Uswah Bangil, SMPN 6 Malang, SMPN 1 Singosari, SMPN 2 Pasirian Lumajang, SMP Wahidiyah Kediri
Senior high school	SMAN 1 Malang, SMAN 3 Malang, SMAN Lawang

The number of users of environmental education services in the Purwodadi Botanical Garden in 2018 was 12012 students. In this study the number of students involved was 227 students. By using the Slovin formula (1), we can calculate the level of allowance achieved is 6.57% (2), and the level of accuracy is 93.43%.

Slovin formula :

$$n = N/(1 + N \times e^2)) \tag{1}$$

Notation:
N   = Total population
n   = Sample population
e   = Margin error

$$e = \sqrt{(N/n - 1)} / N \qquad (2)$$
$$e = \sqrt{(2012/227 - 1)} / 12012$$
$$e = 0,0657 \approx 6,57\%$$

3.3. Test the validity of the results of the questionnaire

The validity test will be calculated using SPSS 16 software. Using Pearson bivariate correlation. Data will be declared valid if r count> r table. The results of the validity calculation are mentioned in table 2. The three questions are declared valid from the results of the validity calculation of the test.

Table 2. Validity test results.

Question item	r count	r table (n=227)	Remarks
Question 1	0.813	0.130	Valid
Question 2	0.837	0.130	Valid
Question 3	0.775	0.130	Valid

n= number of respondent

The reliability Test will get the Cronch Bach alpha value. Data will be declared reliable if the Cronbach Alpha value> table value. The results of the reliability calculations are listed in table 3.

Table 3. Reliability test results.

Question item	r count	r table (n=227)	Remarks
Question 1	0.644	0,1254	Reliable
Question 2	0.594	0,1254	Reliable
Question 3	0.694	0,1254	Reliable

n = number of respondent

From the results of the validity and reliability tests, the questionnaire was declared valid and reliable. Furthermore, the data from the questionnaire results can be analyzed to determine the user's response to QR Codes as a medium of interaction in the Botanical Gardens of Purwodadi.

3.4. Respondent demographics

Based on the sex of the respondents who participated, 64% were female, and 36% were male. The proportion can be seen in figure 6a. Based on the education level of the respondents who participated were 6% elementary school students, 48% junior high school students, and 46% high school students. Diagram based on education level is shown in figure 6b.

(a)   (b)

Figure 6. Respondent: (a) based on gender; (b) based on school level.

3.5. Analysis

The results of the questionnaire based on the school level are mentioned in figure 7a. At the elementary school level stated 47% very satisfied, 47% satisfied, and 7% neutral. In junior high school, 30% were very satisfied, 55% satisfied, 13% neutral, and 1% unsatisfied. In high school, states 39% Very satisfied, 60% satisfied, and 1% neutral.

Each level of education has almost the same percentage, but the greatest value is given to the high school group. According to previous research, senior high school age is approaching 20, and it is possible to have a better understanding of the use of information technology and to have a personal device [16].

In the next question, the user's response to the interest in the use of the information technology interaction media is shown in figure 7b. Classification of the results of the questionnaire based on school is, in primary schools states 47% are very satisfied, 47% are satisfied, and 7% are neutral. In junior high schools, 27% were very satisfied, 59% satisfied, and 14% neutral. At the high school level stated 43% were very satisfied, 50% satisfied, and 7% neutral.
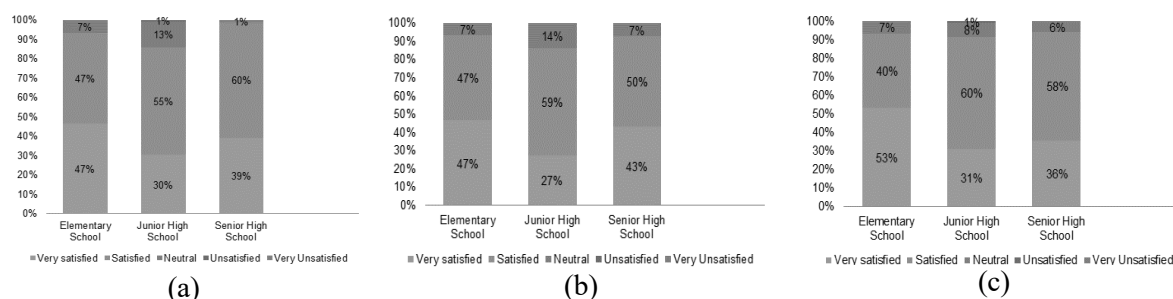

Figure 7. The results of: (a) question 1; (b) question 2; (c) question 3.

The choice of these students can be a concern for the Purwodadi Botanical Gardens to make a strategy of how interactive media can be well-received among students. In another study regarding the use of information technology, it is mentioned that how users want to use the technology is that companies must make the information technology easy to use and contain sufficient information according to consumer needs [17].

The results of the questionnaire on the question "Is the information presented sufficient?" shown in figure 7c. The results For elementary school students are 53% very satisfied, 40% satisfied, and 7% neutral. In junior high schools, 31% were very satisfied, 60% satisfied, 8% neutral, and 1% dissatisfied. At senior high school, 36% were very satisfied, 58% satisfied, and 6% neutral.

In this question the response from respondents was more than 50 percent said they were satisfied, and very satisfied. This question is aimed at capturing the response from the user whether the information connected has fulfilled the wishes of the user. Meanwhile, according to previous research on the use of information technology interaction media such as QR Codes in the tourist visit area, it proved to be efficient and useful for showing information, visiting areas, and transportation [18].

4. Conclusion

The results of the analysis of the use of information technology in the Purwodadi Botanical Gardens show that at the primary school level, 49% are very satisfied, 44% are satisfied. At the secondary school level 30% are very satisfied, 58% are satisfied. At the high school level 39% are very satisfied, 56% are satisfied. from these results, the average state that they are very satisfied is 39%, and 53% say they are satisfied. With the results of this analysis, information technology can be immediately implemented and further developed for environmental education activities at the Purwodadi Botanical Garden.

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