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# Teacher and Student Perspective of Using the Quick Response Code Feature in the Biology Module

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***Abstract*—Quick Response Code (QR-code) allows users to access data quickly and easily through scans on specific devices. Seeing the potential of this QR Code, many of the developed countries have begun to use it in educational practices. Their study conducted to integrate the QR Code in learning activities in the classroom, trying to develop on learning assessment and allowing the use of the QR Code in educational practice both in class and outside the classroom. However, unfortunately on Indonesia, there are still very few academics and teachers who research QR Code potential on the learning process. This study aims to describe the teacher and student's perspective of using the QR-code feature in the module as a source in the biology subject. This type of research is descriptive research. There are two types of data, namely qualitative data through interviews and observations in the field of quantitative data through questionnaires. The research will be conducted at the State 9 Purworejo High School in Yogyakarta and from the Chipta Bakti Husada Health Vocational School. Based on our findings that teachers and students actively support the development of modules with QR Code features in learning to increase student motivation, renew learning textbooks used today, and facilitate teachers in teaching. The recommended materials for making modules are material for Protista, Viruses, Genetics, and Heredity. Student perspective shows a positive direction in which most students have interested the QR Code and agree if it can be included in the lesson.***

***Keywords: quick responses code, teacher perspective, student perspective, biology***

## I. INTRODUCTION

Advances in technology Quick Response Code (QR-code) has a lot of ethical impacts for the industrial sector and agencies. Starting from the ease in recording goods to transactions in virtual money. QR Code allows users to access data quickly and easily through scans on specific devices. Many developed countries have begun to use it in educational practices. Like class management. QR Code helps teachers in administrative matters such as providing contact information from educators to students, making exam schedules, marking the identity of equipment in the class [1].

QR Code can also be used for learning activities such as making books containing QR codes and linking them with educational multimedia sources on the internet by Uniform Resource Locator (URL) or Youtube, providing nutritional information on food products, marking information on parts of the human skeleton, and filling in information on every element in periodic system in learning chemistry [2]. QR codes make it easy for students to fill out surveys during class. Students can also write some comments or feedback to the teacher and classmates, and then it will be stored in the form of a QR Code so that the presentation more orderly. Students can also do formative tests through QR Code technology [3]. Activities that can be done by students are making their QR codes through the assignment method and attaching them in the form of images [4].

Practicum activities can be more interesting if using QR Code, for example, biology field practicum activities, namely exploring and identifying observed species. The teacher can design a guidebook for practical activities by creating a barcode next to a picture of a species. So that when in the field students can effectively learn because when students want to find out information about flora and fauna found in the field, students need to match the images on the QR code sheet and scan the barcode on the mobile device like a smartphone or tablet to find out information from the species [5].

The challenge for educators nowadays is applying technology in learning. The use of technology in learning will undoubtedly facilitate the teacher in teaching students. Therefore, teachers need pedagogical skills in designing learning by utilising technology to solve learning problems. One way that can be taken is to use mobile learning principles. Mobile learning, also known as m-learning, is a new way to access learning content using mobiles devices such as smartphone, tablet, or mobile phone [6]. It has been proven through research that the use of the mobile device in learning can increase learning motivation, learning outcomes, and make the learning process more enjoyable. Students are also more active and creative in participating in learning activities in the classroom with their teachers [7].

Seeing the prospect of QR Code at this time researcher want to develop an educational product by integrating digital-based multimedia content and printed-based learning modules. Inserting multimedia into a printed module can be done using QR Code, a two-dimensional image that represents a data, especially data in the form of text and hyperlinks. The QR Code is easy to generate and access data more quickly and can be read using mobile phone. The QR reader applications for various types of mobile phones are quite widely available to be downloaded for free via the internet [8].

 

The presence of the print module with the QR Code feature is expected to provide an effective, efficient, and enjoyable learning feel for students. This is because the content of learning topics in modules can be more numerous and varied. Besides, modules are more comfortable and more practical to use in learning. For this purpose, a preliminary study is needed to reveal the perspectives of teachers and students with the existence of QR Code for education.

## II. METHODS

This research is a descriptive study to find out the perspective of teachers and students on the use of the QR Code feature in the biology learning module in increasing student motivation. Analysis results are described through observational data in the field. There are two types of data. The first quantitative data type is about; (1) student learning motivation through the ARCS model questionnaire, (2) data on the characteristics of biological material, (3) data on the assessment of biological learning resources, (4) data on the readiness of using student mobile learning, (5) student perspective data on the use of QR features Code on the biology learning module. The second type of data is qualitative data by looking at situations and conditions during learning and through interviews with subject teachers. Data collection techniques in this study are observation, interviews, and questionnaires. The research subjects were two biology subject teachers, 30 students from Chipta Bakti Husada Health Vocational School and 22 students at SMAN 9 Purworejo.

## III. RESULT

This study collected statistically relevant data from teachers and students, data collected based on observations, interviews and questionnaires in both schools. Findings from our observations discussed in the following sections.

### *A. Survey Results from the Teacher's Perspective*

Data obtained through interviews with subject teachers are student learning processes, student motivation, student and learning outcomes. According to biology teachers, both in high school and at vocational high school, students' readiness for learning has different intrinsic motivations. There are students whose enthusiasm to follow biology learning has been high since the beginning; some are low. Students motivation showed when apperception activities carried out by the teacher. The method most often used by teachers is the lecture and assignment methods. They admit that this method is less useful for learning biology, which is full of abstract concepts. However, this method chosen because it is easy to apply to students and students is accustomed to using this lecture method.

Learning resources commonly used by teachers are learning package books. Not all students can use the book because the numbers are limited and also the learning package books can only use in the scope of the school. The learning media used by teachers are still conventional, namely by utilising the resources available in the scope of the school. Whereas for computer-based media that is using *powerpoint* media. The teacher recognises that the existence of learning media used in class will provoke students' motivation to learn. This can be seen from their enthusiasm to pay attention to the media, and their curiosity increased.

The material in biology that is difficult to teach is dependent on the grade level — starting from the 1st grade, namely "Protista and Virus" material. The difficulty of this material because of the microscopic observation objects, unable to reach by the eye. Currently, the media used by teachers is to show pictures through textbooks. In the 2nd grade, the material that is difficult to teach is the transport system and the motion system, and in-class XII almost everything is difficult to teach, especially genetics and metabolism because it involves chemical processes in changing the energy in the body. Of course, it is very abstract to teach.

The difficulty of teaching biological material, in general, is because the media currently available are limited, mainly if only relying on textbooks in learning. Even though the advancement of technology nowadays can make it easier for teachers to teach. Therefore, the researchers introduced the QR Code technology to the teacher. QR Code technology can accommodate learning content such as video, text, audio, and applications into printed learning resources in the form of barcodes.

The response of teachers after learning the working principle of the QR Code is that they are happy and supportive, thus suggesting this technology should be developed immediately to assist teachers in teaching. With the QR Code, the teacher can easily convey biological material that is conceptual and abstract to be studied. Also, teachers quickly provide evaluations and feedback to students through links to the online quiz after they learn the material. The application of QR Code should be integrated with printed books to make it easier for students to read lessons and for students' writing activities. The highly recommended QR Code feature is displaying learning videos, online quizzes, and also additional material relevant to the curriculum such as news, research, and scientific facts from biology learning.

### *B. Student motivation survey*

Data collection on student motivation is based on the consideration of students' readiness in learning because a critical aspect of learning is the aspect of motivation. Student learning motivation collected through a questionnaire of 20 statements. This questionnaire was obtained from motivation theory, according to Keller, through the Instructional Materials Motivation Survey (IMMS) questionnaire, which designed to measure reactions to self-directed instructional materials.

TABLE 1. INSTRUCTIONAL MATERIAL MOTIVATION SURVEY

| Aspects | Scores | SD |
|---|---|---|
| Attention | 3,71 | 0,26 |
| Relevance | 3,83 | 0,38 |
| Confidence | 3,68 | 0,24 |
| Satisfaction | 3,66 | 0,34 |

This survey uses five scales, while the survey results revealed that scores from all aspects did not even reach number four. This indicates that student motivation is still relatively moderate. The highest aspect is relevance, with a score of 3.83 means that students feel that learning is now quite relevant to their interests. The lowest aspect is satisfaction with a score of 3.66, meaning students are still unsure of completing the subject matter.

### C. *Characteristics of Biological material*

This survey aims to find out how students' perspectives on biological material are difficult to understand at the 1st grade and 3rd grade. There were 52 students taking part in the survey, consisting of 22 students of 3rd grade and 30 students of 1st grade.

In the survey analysis of the characteristics of biological material, students are allowed to choose two subjects that considered challenging to understand. So for the group of class X students, amounting to 30 people have a total of 60 answers, while for the group of class XII students amounting to 22 people have an answer score of 44. From the data it is shown that the two materials that students have difficulty understanding for the 1st grade are "Protista" material as much as 31.66% and viruses 23.33%, this is following the alleged answers from previous biology subject teachers.

TABLE 2. INSTRUCTIONAL BIOLOGY SUBJECT MATTER SURVEY

| Subject Matter Class X | Student Response | (%) | Subject Matter Class XII | Student Response | (%) |
|---|---|---|---|---|---|
| Scope of Biology | 5 | 8.33 | Metabolism | 4 | 9.09 |
| Classification of Living Things | 4 | 6.66 | Genetics | 10 | 22.72 |
| Virus | 14 | 23.33 | Cell Division | 5 | 11.36 |
| Protista | 19 | 31.66 | Heredity | 9 | 20.45 |
| Ecology | 7 | 11.66 | Mutation | 8 | 18.18 |
| Plantae | 6 | 10.00 | Evolution | 5 | 11.36 |
| Animalia | 5 | 8.33 | Biotechnology | 3 | 6.81 |
| **Total** | 60 | 100 | **Total** | 44 | 100 |

As for the class XII group two materials that students have difficulty understanding are genetics (22.72%) and patterns of heredity (20.45%) this is also following the biology teacher's statement that genetics is a material that is difficult to teach. Based on the data, it is known that material that is difficult for teachers to teach, and that is difficult for students to understand, can be a reference for future researchers to consider the material for learning media.

### D. *Assessment of Biology learning resources*

The next assessment survey is that biology learning resource. The aims of this survey to determine students' perceptions so far how the application of learning resources they have used so far, especially learning package books.

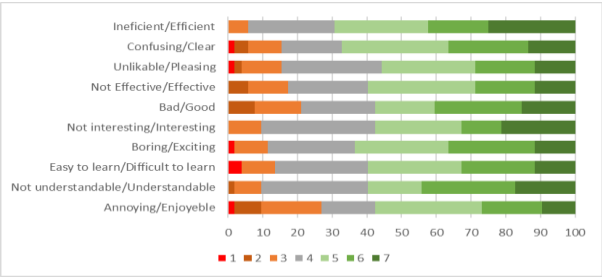


Fig. 1. Assessment of learning biology resources by student perspective

This survey uses seven scales to provide an assessment of the product. Scale one to three shows the tendency of respondents to give a negative assessment of the product, the fourth scale shows a neutral or indecisive nature, while a scale of five to seven shows the tendency of the response to give a positive assessment of the product. Based on student data has shown more than 50% positive attitude on the use of books as a source of learning from the ten available aspects. Around 20% until 30% of students show a doubtful attitude using existing books. Moreover, less than 20% of students show a negative attitude towards the use of learning resources today.

Based on the data it can be seen that 40% of students feel hesitant in participating in learning if they only rely on biology learning textbooks, the use of books is still felt to be unable to foster student motivation or enthusiasm for learning. The most positive attitude shown by respondents is in the practical aspects and real clarity, but the most negative attitude shown in the troublesome and unattractive aspects. Based on these data, researchers can consider designing an instructional media that is interesting to use and easy to learn by students.

### E. *Student readiness to use mobile learning*

This survey conducted to reveal the readiness of students to use mobile devices or smartphones in learning. Based on student responses, it is known that all students or 100% of students already have a smartphone. Furthermore, students present their smartphone usage data in their daily lives.

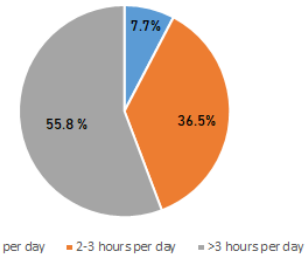


Fig. 2. Frequency of using mobile phones

Based on the data, it is known that students have been using smartphones for more than three hours a day. According to students, the use of smartphones in learning makes it easy for them to find additional information for learning. Based on the survey results, it is known that 96.2% or 50 students agree and strongly agree to use a smartphone for learning activities. The use of smartphones in some schools is also permitted for learning activities.

### F. *Use of the QR Code feature on the module*

The purpose of this survey is to find out how students respond if there is a QR Code feature in the biology learning module. Before starting the survey, students are first introduced to the QR Code feature. After students understand the workings of this feature, students are then asked for their opinions through the questionnaire sheet.

The results from the questionnaire are presented in the following figure.

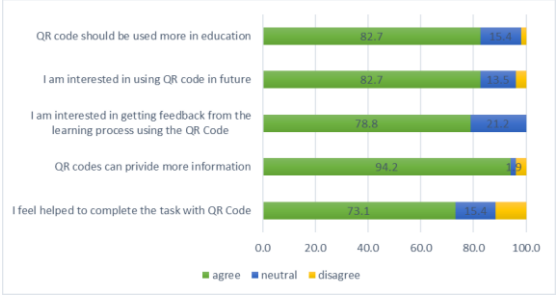


Fig. 3. Student perspective of using QR code in module

The survey results show that students gave a positive assessment of the use of the QR Code feature in future learning. As shown in the data that around 80% of students agreed that the QR Code could be included in the lesson. They are interested in using the QR Code in the learning process. As many as 94.2% of students acknowledge the ability of the QR Code to store various information. The lowest survey that is in the perspective of students QR Code can help them to complete tasks (73%), this is reasonable because students have never used the QR Code to do the quiz.

Furthermore, students are asked for their opinions on what media students recommend from the QR Code to be displayed in books or learning modules. A total of 26 students (50%) recommend displaying instructional videos, followed by 22 students (42%) recommend quiz online, 16 students (30%) recommend pictures, and the remaining nine students (17%) recommend online news and audio. Learning videos become the most choices because video media is felt to be more able to attract the attention of students and also the delivery of messages is more memorable because it uses many senses in its application.

## IV. DISCUSSION

### *A. QR Code in the learning context*

Based on the results of field observations, it can be seen that the media needs for biology learning are urgently needed by students and teachers today. Especially in teaching or learning materials that are abstract and difficult to understand for students such as “Protista” material in class X and genetics in class XII. Besides that, the readiness of students is accustomed to using smartphone media in their daily lives but has not been maximised for the learning context. Though mobile learning has the potential to increase student motivation. Besides that, the use of mobile learning also makes the learning situation more authentic with the help of technology because it can bring up real examples through learning video content, so that help students to understand abstract and to try to understand material [9].

QR Code is very suitable designed for mobile learning because the decoding process is by scanning the barcode with a mobile device that has equipped with a camera and QR reader software. QR codes also make it possible to connect digital resources to printed text. This implies the potential for enriched paper-based learning [10]. Another potential is that mobile learning not only facilitates learning in the classroom but also can accommodate learning outside the classroom, and learning material is no longer limited to textbooks [11]. Learning strategies in mobile learning can also be set as independent learning or collaborative learning [2]. Therefore this potential in solving student learning problems.

### *B. QR Code design and learning strategies*

A learning designer must pay attention to the character of cellular learning, which includes personalisation, authenticity, and collaboration. The authenticity feature can promote learning scenarios such as contextual, participatory and situated learning [12]. The principle of personalisation is to provide learning activities that are relevant and familiar with the student environment [13]. Therefore the right design and strategy are needed for learning to use mobile learning by using the QR Code feature.

This learning design accommodates from the learning problems that have been presented previously, such as student motivation and the need for learning media that is fun, enjoyable, interesting and practical to use. The process for student motivation is based on the ARCS principles proposed by Keller. The principle of Attention is to maintain the attractiveness of students to participate in learning, and this can be done by providing stimulation to students to learn. One functional stimulation is to present learning media. The principle of relevance that is designing learning in accordance with the learning styles and personal interests of students, besides the goal-oriented factor in learning must also be considered. Confidence Principle, namely students, have the confidence to complete each level of tasks given. Furthermore, the last principle is that student satisfaction has a positive perception of the learning he has taken [14] [15].

Based on the principles in ARCS, it will be made how the design model and learning strategy in using the QR Code feature in the biology module.

TABLE 3. INSTRUCTIONAL BIOLOGY SUBJECT MATTER SURVEY

| Design Features | Design Strategies |
|---|---|
| Link to Video | • Interesting animated videos according to the characteristics of teenage students<br>• Videos have shown support students' knowledge of concepts in mastering material that is difficult to understand<br>• Students watch learning videos together with their friends<br>• Students can discuss videos that they have seen with their friends<br>• Students write concepts through mind mapping in the module<br>• Students communicate the results of their writing to classmates |
| Link to Online Quiz | • The simple layout of the quiz<br>• The quiz can ask for student identity (such as name, class, and student identification number)<br>• The quiz is given in a structured manner after learning is finished<br>• Quizzes are carried out individually<br>• Questions in the quiz are made more varied (such as multiple-choice questions, matching answers, filling)<br>• The number of questions in the quiz is no more than 10<br>• The complexity of the questions in the quiz is conditioned according to the characteristics of students<br>• Students can do remedial in the quiz without a final limit<br>• Students who have completed the quiz have a mastery degree<br>• Students who have finished can help their friends who are struggling without telling the answers to be chosen |
| Link to News | • The news presented attracts the attention and curiosity of students<br>• News that presented relates to the concept being studied but is more towards examples<br>• News that is presented using language that is easily understood by students<br>• After reading the news, the student can communicate what he understands<br>• Students can be given independent assignments to look for other relevant news related to the concepts learned, and they can create their own QR Code<br>• QR Code that has been created can be pasted in the module or in the wall magazine in the class |

The QR Code feature development is based on the results obtained in the field, namely a large number of

students requesting that the QR Code be able to display video, news, and game-based online queries. QR Code is very efficient and flexible to be used by students to support their learning process. Accordance with previous research that the use of QR Code in paper-based tasks can contain links to multimedia resources such as audio material or video clips for understanding concepts and also exercises [2]. QR codes can support collaborative learning as in research that QR codes enable learning with an innovative technology system based on the collaborative learning paradigm [1]. Besides, the QR code can also guide students through the process of self-assessment through work with quiz students easy to measure the level of their knowledge [16].

The pedagogic aspect that must be considered in using the QR Code for mobile learning activities is the teacher's role must be balanced. Teachers should not only rely on the QR Code for student learning processes, but teachers must also be able to provide explanations and reinforcement of positive reinforcement when the learning process takes place [17]. Also, the teacher must prepare and ensure the hyperlink for the QR Code feature is functioning correctly or not. The other role of the teacher is to ensure that students already understand in principle the workings of the QR Code because if students are not ready to use this technology will reduce their motivation to learn and make them unenthusiastic in learning [16].

Our research needs to be supported by further research because the results of the problems found in the field must be developed immediately. The results of this study are the design that can be used by the development team in the product development process. So we hope that the data in this study can be considered by further research.

## V. CONCLUSION

The use of QR Codes for biology learning modules must be developed immediately. This is consistent with our findings in the field that when introduced to the QR Code feature students and teachers are very enthusiastic and interested in using it. Based on the results of teacher interviews is also very supportive if the QR Code is applied in student textbooks or using modules, as well as the student questionnaire statistics more than 80% of students are interested in using the QR Code and agree if it can be included in the lesson. As many as 94.2% of students acknowledge the ability of the QR Code to store various information. Recommended features are as many as 26 students (50%) recommend to display learning videos, followed by 22 students (42%) recommend online quiz, 16 students (30%) recommend pictures, and the remaining nine students (17%) recommend news online and audio.

We also found that students were very familiar with using a mobile device or smartphones as a means of communication and searching for information. Besides, schools also allow students to use smartphones for learning activities. Biology material suggested by teachers and students at 1st grade is "Virus and Protista", while the 3rd grade material is genetics, metabolism, and heredity. Assessment of learning resources for biology textbooks shows more than 50% positive attitudes about 20% -30% of students show doubtful attitudes and less than 20% of students show negative attitudes towards the use of learning resources from the ten aspects assessed. The data showed that the source of learning biology needs to be increased again to support student motivation and learning outcomes.

In this study, we also recommend using fetal designs and design strategies that have been made. This can facilitate further researchers in designing features and how to use these features in the context of paper-based tasks through modules

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