

Development of Integrated QR Code Module on Physics Learning Module to Increase Learning Interest and Knowing Students' Digital Literacy

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Abstract: A solution for learning in the form of a module integrated with a QR code is offered to assist lecturers in delivering material to students of Physics Education Study Program. With the integrated QR code physics learning module, it is able to increase interest improve students' digital literacy. The method of research is research and development and the analysis was carried out based on the questionnaire data processing. The result shows that the increase of average percentage value of the measurement of interest in learning is 22.24% and the average percentage value of the measurement of digital literacy ability is 80.90%. Based on the results, the conclusions are the integrated QR code on physics learning module is effective to increase interest in learning and students have high digital literacy skills because they are able to take advantage of digital media for the learning process.

Keywords: Learning module; QR code; Learning interest; Digital literacy.

Introduction

Government Regulation (PP) No. 19 of 2005 Chapter IV Article 19 Paragraph 1 states that the implementation of learning in educational units must be carried out in an interactive, inspirational, fun, challenging. Moreover, it must be able to motivate students to participate actively and provide space as a means of initiative, creativity, and independence according to the talents, interests, psychology, and physical development of students. Fun learning activities can affect the quality of student learning. One of the things that can be done in order to create this atmosphere is using creative and innovative learning modules. Learning resources need to be used synergistically to optimize learning, therefore it will be easier for educators to implement learning. This is necessary in order to create conditions that can encourage students to achieve their competence in the learning provided by educators (Tafonao, 2018).

The learning module is a systematic, interesting, and clear teaching material containing materials, methods, and evaluations for students. Students can take advantage of the module to study independently or in groups anywhere and anytime, in order to achieve competencies or the ultimate goal achieved from a learning activity. According to (Novitasari et al., 2016) modules should be developed based on curriculum development, which ideally can involve students actively. Modules not only stick to cognitive aspects, but also psychomotor and attitudes.

QR code is a type of matrix code that is capable of storing data or information horizontally and vertically. The purpose of a QR code is to convey information quickly and respond quickly too. To get a response, the user must scan the code using a QR scanner. QR code can be used in learning process as a means of presenting information in limited space (Saenab & Saleh, 2017). The QR code can be applied in education, such as by going to specific learning addresses related to certain materials

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(Sianipar et al., 2021). Learning using QR code assisted by smartphone media can make learning more interesting and motivate students to learn, hence they can increase their interest in learning. The use of QR code is also one of the digital literacy concepts. In its use, it requires the ability to use technology. Digital literacy is the ability to obtain, use, create, and develop digital information as a solution in doing work (Atmanegara, 2019).

The use of QR codes in education itself has been done before, as in (Salleh et al., 2018) regarded the use of QR codes as learning media for foreign languages, and as in (Ataji, 2019) regarded the development of modules based on QR code technology on human reproductive system material integrated with the Al-Quran and Hadith as a learning resource for class XI Biology in SMAN 1 Punggur.

Physics is a branch of science that is difficult to understand as it requires the ability to think critically and realistically. Therefore, it is necessary to apply an innovation media in learning and teaching process based on technology to motivate and stimulate the student in learning physics (Mahyuddin et al., 2017). Learning based technology is expected to increase the learning interest of students. Learning interest is the driving factor existing within the individual to carry out learning activities to increase knowledge, skills and experience (Andi, 2019). In the learning process, interest is the first step that students must have to achieve learning goals. Interest comes from the interaction of individuals with their environment, characterized by learning motives and strategies. Interest itself is indicated by affective and cognitive aspects related to emotional experiences and personal relationships and readiness to engage in learning (Arikpo & Domike, 2015).

There are several factors affecting students' interest in learning, these are motivation, facilities and infrastructure at the place of learning, attitudes towards educators and lessons, family, and social friends (Fadillah, 2016). Meanwhile, the factors raising interest in learning consist of internal and external factors. Internal factors consist of motivation, aspirations, and talents. External factors consist of teachers or educators, family, social friends, and the environment (Fauziah et al., 2017). Factors influencing interest in learning include interaction of students with educators, teacher responses, learning places, and educators' attention. All has influence on interest in learning.

In addition to increasing interest in learning, it also increases digital literacy of students. Digital literacy is the ability to use and operate various information and communication technology devices consisting of hardware and software. They are able to read and understand the contents of these technology devices and the processes for creating and writing, thus they become

new sources of knowledge (Kurnianingsih et al., 2017). Digital literacy is the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technology for various sectors of life. It includes multiple competencies: computer literacy, ICT literacy, information literacy, and media literacy (UNESCO, 2018). It describes as a form of a certain way of thinking (multi-construct hypothesis) in utilizing digital media (Yustika & Iswati, 2020). Being digital literate means being able to process, understand information, and communicate effectively. Using digital literacy requires awareness and critical thinking of the positive and negative effects that may occur from the use of technology (Nasrullah et al., 2017).

The application was implemented for students of the Physics Education Study Program at University of Jember. The reason for choosing the target is to maximize students' understanding of one of the subjects in Physics Education that is the Basic Physics 3. Formerly, using (conventional) learning theory with text book and limited power points with a two-dimensional display was considered boring since they only listened and observed lecturers' explanations. Hopefully, innovative learning module will be able to attract attention, increase student concentration and understanding, and be able to build student independence.

Based on the background of the problem, a solution for learning in the form of a module integrated with a QR code (Quick Response Code) is offered to assist lecturers in delivering material to students of Physics Education Study Program. QR code integrated learning module means a module in which QR codes must be scanned using smartphone media. With the integrated QR code physics learning module, hopefully it is able to increase interest in learning as learning by utilizing technology-based modules will be more interesting. In addition, this module will improve students' digital literacy, which is the ability to use digital technology applied in learning.

Method

The research conducted was research on the use of integrated QR code learning module in Basic Physics subject for optical material. The research objects of the integrated QR code learning module were 38 students from the Physics Education Study Program, Faculty of Teaching and Education, University of Jember. The 38 students took the Basic Physics 3 subject in the uneven semester of 2020-2021.

This type of research is a Research and Development (R&D) research using the 4D model. The 4D model consists of several stages: definition, design, development and product trial, and dissemination. Due

to time constraints, this research was conducted using the development stages from the description stage to the development stage and only limited trials.

The instruments of this study consisted of validation instruments and user responses to determine the increase in learning interest and digital literacy skills. The validation stage uses two expert validation people from FKIP Jember University. The equation used to calculate the results of the validator sheet is as Equation 1.

$$V_a = \frac{T_{se}}{T_{sh}} \times 100\% \tag{1}$$

Information:

V_a = percentage sought

T_{se} = number of expert validation scores

T_{sh} = total maximum value

After the validation value is obtained, the score is interpreted based on the validity criteria shown in

Table 1. Validation criteria

Percentage (%)	Criteria
85.01-100	Very valid
70.01-85	Quite valid
50.01-70	Less valid
01.00-50	Not valid

(Akbar,2013)

Furthermore, students were given response questionnaires before and after learning using the qr code module to find out the increase in interest in learning. Then, a digital literacy questionnaire was given to determine students' digital literacy skills. The results of the response questionnaire to determine students' interest in learning and digital literacy skills were analyzed based on the categories of learning interests and students' digital literacy abilities, as shown by the table of score interpretation criteria (Table 2).

Table 2. Category of percentage

Percentage (%)	Category
80 < P ≤ 100	Very high
60 < P ≤ 80	High
40 < P ≤ 60	Sufficient
20 < P ≤ 40	Less
P ≤ 20	Extremely less

(Arikunto, 2010)

Result and Discussion

Result

Research result on developing physics learning module using integrated QR code to increase learning

interest and digital literacy skills of physics education students has been completed. The number of respondents was 38 students, they took Basic Physics 3 class studying optical material. The integrated QR code on physics learning module created by the researcher contains codes in which scanned animations and videos will appear and help students in studying optical material. In addition to containing animations and videos, the code also contains answers to practice questions in the module. The learning module contains three learning activities. Altogether there are seven QR codes in the module. Figures 2 and 3 below show the contents contained in the QR code.

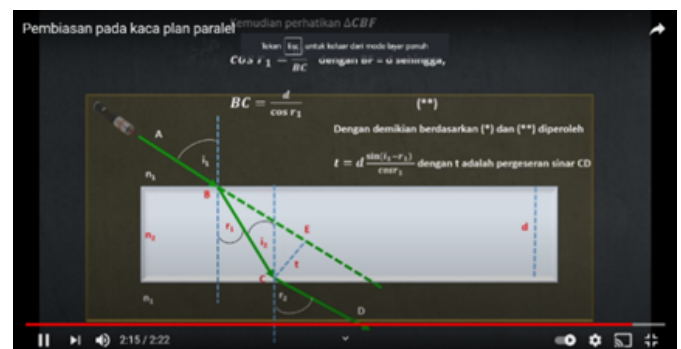


Figure 2. Video created into QR code.

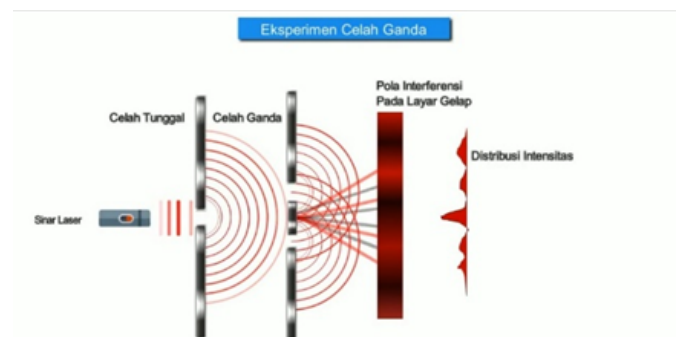


Figure 3. Animation created into code.

This integrated QR code on physics learning module has been validated. The aspects assessed are construct, content, language, and display format. Based on the expert validator, the construct aspect of the module made has a percentage value of 90.0%, the content aspect is 92.6%, and the format and language aspects are 92.0%. Based on these three aspects, the average validation value is 91.4%. Based on this percentage, it can be categorized that the integrated QR code physics learning module is very valid. This shows that the modules created can be used for learning activities.

After the module is validated, a measurement of interest in learning is carried out on the integrated QR code on physics learning module for Basic Physics 3 in optical material courses. Measurement of interest is obtained based on questionnaire responses made with

google form. Students are asked to respond to questions on the form. The results of the responses were analyzed. Measurement of interest in learning is carried out twice; these are interest before using the integrated QR code module and interest after using the integrated QR code module. Measurements were made to determine the percentage value of each interest indicator used in the study. The indicators of interest in learning in this study include pleasure, attention, willingness to learn, and involvement (Lestari & Mokhamad, 2017). The results obtained for measuring student interest in learning before using the integrated learning module QR code are shown in Table 2 and measurements after using the module are shown in Table 3.

Table 2. Rate of Learning Interest before Using Module

Interest Indicator	Rate before using module (%)
Pleasure	56.58
Attention	57.89
Willingness to learn	56.58
Involvement	67.10
Average	59.54

In Table 2, it can be seen that the indicators of pleasure, attention, and willingness to learn before using the integrated physics learning module QR code are sufficient. Meanwhile, the indicators of involvement have high category. The table also has the average value of the total indicators indicating student interest in learning. The average value obtained is 59.54% which is categorized sufficient.

Table 3. Rate of Learning Interest after using module

Interest Indicator	Rate after using module (%)
Pleasure	81.05
Attention	80.92
Willingness to learn	80.76
Involvement	84.39
Average	81.78

Table 3 shows the percentage of each indicator of interest in learning after using the integrated QR code in physics learning module. In the table, it can be seen that there is an increase in the percentage of each indicator. The pleasure indicator has percentage of 81.05% or there is an increase of 32.95% from the percentage value before using the integrated QR code on physics learning module. Then, the attention indicator has percentage of 80.92% or there is an increase of 23.03% from the initial percentage value. The indicator of willingness to learn after using the integrated QR code physics learning module has percentage of 80.76%. This means that the willingness to learn indicator has increased the percentage of 24.18%. The involvement indicator has percentage of 84.39% or there is an increase of 17.29% from the percentage after using the integrated QR code on physics learning module. The average value after

using the physics learning module is 81.78%. It can be said that the average value has increased by 22.24% from the average value before using the integrated QR on code physics learning module.

In addition to measuring and analyzing student interest in learning, research also measures students' digital literacy skills. The measurement is based on digital literacy ability questionnaire form using google form. The results of the digital literacy skills of physics education students are shown in Table 4.

Table 4. Indicator of Digital Literacy and its Percentage

Indicator of Digital Literacy	Percentage of Ability (%)
Use skills	79.75
Critical understanding	85.19
Communicative abilities	77.78
Average	80.90

Based on Table 4, it can be observed that the use skills indicator has percentage of 79.75% or it is a high category. Then the critical understanding indicator has percentage of 85.19% which is categorized very high. The Communicative Abilities indicator has a percentage of 77.78. This result means that the communicative abilities indicator of physics education students is categorized high.

Discussion

Analysis of Student Learning Interests

Measuring interest in learning uses four indicators, these are interest, attention, willingness to learn, and involvement. Learning interest measured is before using and after using the integrated QR code physics learning module. For interest in learning before using the module, the results for indicators of interest, attention, and willingness to learn were categorized quite high. Meanwhile, involvement is categorized high. The average interest in learning before using the integrated QR code on physics learning module is categorized quite high.

Meanwhile, the interest in learning after using the module obtained that the categories for all indicators of interest in learning are very high. Likewise, the average value is categorized very high. In interest indicator, there is an increase of 32.95% after using the physics learning module. The attention indicator has increased by 23.03% from the initial percentage value. The indicator of willingness to learn after using the integrated QR code on physics learning module has increased a percentage of 24.18%. The involvement indicator increased by 17.29% from the percentage after using the integrated QR on code physics learning module. Based on the percentage of the increase in the interest in learning indicator, it can be seen that the highest percentage increase is student interest. This is because learning using integrated QR code on physics

learning module is being carried out for the first time, thus it makes students like learning using this module. The second percentage increase is indicator of willingness to learn. This indicator has increased due to a high sense of interest, which makes students have the willingness to learn the material. Furthermore, the increase in the attention indicator is due to the existence of a module that would make students' attention both to the lecturers and the material more focused. Then with the integrated learning module QR code, it makes students involved in the learning process hence the indicators of involvement also increase. Students are invited to observe scanned videos and learning animations for later understanding and analysis.

Based on the increase in percentage results of the indicators, it can be said that the integrated QR code on physics learning module is effective for increasing interest in learning. There is an increase in interest in learning due to varied efforts (Ricardo & Meilani, 2017). This is also consistent with research by Tan, which states that QR codes can motivate students to learn because they fulfill their learning needs. This tool increases student interest in learning, encourages social learning, and demonstrates advantages like ease of use. Motivation stimulates students to continue learning (Tan & Chee, 2021). The effort made in this research is in by making modules for learning activities in order to create a conducive and cooperative learning situation.

Analysis of Student Digital Literacy Ability

Digital literacy is one of the six basic literacy applied mainly in learning activities. Five other things include literacy, numeracy, science, finance, culture, and citizenship (Pratama et al., 2019). Digital literacy skills can be measured based on certain indicators. These indicators consist of personal competence and social competence. Personal competence is an individual's ability to use and analyze media and its content. This indicator is divided into use skills and critical understanding. Use skills are the ability to operate the media. Critical understanding is the ability for a person to understand, analyze, and evaluate the content contained in media. Social competence is a person's communication skills and building social relation through the media. This ability consists of communicative abilities, these are the ability for a person to socialize and participate in community through the media. Communicative abilities also relate to a person's ability to create media content (Kurniawati & Baroroh, 2016).

Based on Table 4, it can be seen that the percentage for the use skills indicator is 79.75%. It can be categorized that the ability of physics education students to operate or use digital media is high. From this indicator, it can be seen that students can use several types of digital media and their content which is useful in learning

activities, especially when using this integrated QR code physics learning module. The critical understanding indicator has percentage of 85.19%. This result can be categorized very high. This means that the ability of students to choose content from digital media is high. Students are able to find, sort, and analyze material needs for courses, especially Basic Physics 3 subject that can help the learning process. Then, the communicative abilities indicator has percentage of 77.78% which is categorized high. This states that the social skills of students in using digital media for their learning needs are very high. By using digital media, one student can discuss with other students to discuss problems appearing in lectures, especially in the use of integrated QR code on physics learning module in Basic Physics 3 for optical material courses. Based on the percentage value of each indicator, the average score for students' digital literacy skills is 80.90% which is categorized very high. Thus, it can be concluded that physics education students have good digital literacy skills as they are able to utilize digital media for the learning process.

The results of the excellent digital literacy of physics education students make their provision as prospective teachers. this is because, in the era of 21st-century learning, digital literacy possessed by future teachers in the field of education will help them become skilled teachers who can utilize information and communication technology efficiently and effectively (Özden, 2018). Applying digital literacy in an academic environment can promote sustainable student lifelong learning in light of rapid technological changes (Techataweewan & Prasertsin, 2018).

Conclusion

Based on the results obtained in the research on the development of integrated QR code on physics learning module in order to increase students' interest in learning and digital literacy skills, it can be concluded as that the integrated QR code on physics learning module is effective to increase interest in learning. This is based on the increase in the percentage yield of each indicator. The average percentage value of the measurement of interest in learning shows an increase of 22.24%. From these, Physics education students have very high digital literacy skills because they are able to take advantage of digital media for the learning process when they learned to use integrated QR code physics learning module.

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