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DEVELOPMENT OF ASSESSMENT TECHNOLOGY INNOVATION TO REDUCE ACADEMIC CHEATING

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Abstract

Assessment activities in learning evaluation currently still use commonly used media such as Google Form or paper, which are often at risk of academic cheating. Therefore, this research aims to develop formative assessment media innovations that are suitable for use in learning evaluation. This assessment media utilizes technology in the form of QR cards, which are unique to each student, to facilitate answering assessment questions and reduce academic cheating. This development research was carried out on formative assessment activities for S1 Educational Technology students of the 2023 batch, a total of 4 classes in the Multimedia Innovation course. The research procedure employed utilizes the Research & Development method, adopting Thiagarajan's development model, specifically Define, Design, Develop, and Disseminate (4D). The data collection technique consisted of a media expert validation questionnaire and a respondent questionnaire to determine the feasibility of the assessment media. The research instruments used were validation sheets and student response questionnaires. The data obtained will be analyzed in a quantitative descriptive way. The final result of this study is in the form of a formative assessment media product based on QR technology. The results of this study received a positive response from media experts and students, who indicated that this assessment medium is suitable for use as a learning evaluation tool to reduce academic cheating.

Keywords: Formative Assessment; Learning Innovation; Academic Cheating

1. Introduction

The development of Information and Communication Technology (ICT) in the current era of globalization has had a significant impact on various aspects of life, including education. Facilitating learning is one element in the definition of educational technology. Technology plays a crucial role in creating an environment that not only presents knowledge but also provides the space and tools to explore that knowledge, thereby supporting the learning process. Therefore, creating a supportive learning environment can facilitate the learning process (Soepriyanto, 2019).

Both teachers and students need to adapt to the use of technology in the learning process, so teachers are required to be able to innovate by facilitating education using tools that are in accordance with current developments and current needs. Teachers must have the skills to select and use various types of technology, as well as being able to develop innovative learning media according to student needs (Ally, 2019). Thus, teachers can create an active, interesting, and student-centered learning environment, thereby improving the overall quality of learning (Ngongo et al., 2019). Changes in the field of education can be considered an innovation if they are carried out intentionally to improve existing conditions, so that they are more profitable and have a positive impact on improving the quality of life.

One of the primary tasks of teachers in the learning process is the ability to assess both the process and outcomes of student learning in the classroom. Assessing these learning processes and outcomes requires adequate specialized skills, especially in today's era of rapidly advancing technology (Surahman et al., 2024). Assessment is a continuous, systematic process of collecting data to measure individual student learning progress and provide constructive feedback to improve the quality of learning (Nasution, 2022). Assessment activities in learning are a crucial aspect. Assessment is a key component of the learning system. Effective assessment can produce good and valid results. Quality assessment results are very useful for designing improvement plans in the learning process (Surahman et al., 2018). Therefore, assessment in learning assessment activities is a crucial element that serves as a benchmark for the success of the educational process, because, through this evaluation, it can be seen the extent to which learning objectives have been achieved and how students' competencies have developed.

Assessment is a systematic activity in interpreting student learning outcomes data obtained through the learning process. This assessment activity is carried out in two different phases, namely formative assessment and summative assessment. Formative assessment is carried out during the learning process to improve and enhance the quality of learning itself. Meanwhile, summative assessment is carried out after all learning units are completed (at the end of the learning period), aiming to determine grades that reflect student learning success (Sriyanti, 2019). To create optimal evaluation results, students must have a good understanding of the learning process that has passed with innovative learning that is not boring for students, so that students get a good learning impression (Noermanzah, n.d.). Therefore, the role of creative and innovative teachers is very important in creating an interesting and memorable learning process.

Research result Regional Educational Laboratory (REL), a research institution specializing in formative evaluation in America, shows that teachers in the region use various methods, including technology, to conduct formative assessments to support engaging learning for students (Makkonen & Jaquet, 2020). One of the advantages of formative assessment with technology is the ability of teachers to collect and evaluate student achievement quickly, even in short learning situations (Elmahdi et al., 2018). Thus, formative assessment using technology can facilitate the monitoring of student learning progress effectively. Real-time, enabling timely intervention, and increasing overall learning effectiveness.

One indicator of success in assessing educational quality is the evaluation score of learning outcomes. Every student, whether in elementary or secondary education or in higher education, naturally desires good grades, as these are a measure of individual success. Therefore, various efforts are made to achieve satisfactory results in exams, including academic cheating (cheating in academic activities).

Academic cheating (academic cheating) is an illegal behavior that uses unethical methods to achieve academic success and avoid academic failure. This cheating act can substantially cause the results of students' abilities to be obscured. Based on the classification, cheating behavior can be divided into three categories, namely 1) sending, storing, or receiving certain information without permission, 2) using prohibited tools, and 3) exploiting the weaknesses of other people, procedures, or processes to gain benefits in an unethical manner (Cizek, 2003).

One of the formative assessment evaluation tools that is integrated with technology is an application. This application can be used to test students' knowledge through multiple-choice questions and allows for quick results. Students answer directly and spontaneously by showing their cards.Plickers (Wood et al., 2021a). This eliminates the need to copy their friends' answers and reduces academic dishonesty. With this feature, Plickers helps teachers carry out assessments and collect evaluation data effectively in real-time, which can create a fun learning environment. This application can also increase student active participation in the learning process, as the assessment format is designed similarly to a game (Kent, 2019).

Recent developments in artificial intelligence (AI), like chatbot AI and Generative methods, have added complexity to the various academic cheating challenges faced by higher education institutions (Oravec, n.d.). Students tend to interact routinely with technology-enabled cheating detection systems on their laptops and in the context of their exams (Keyser & Doyle, 2020). A study of undergraduate students in food science and technology showed that assessment media Plickers can increase student-centered active learning and their engagement, which has a positive impact on learning outcomes (Mshayisa, 2020).

Based on the research that has been conducted, the assessment media uses Plickers, an innovative student response system (SRS) that integrates various features from existing SRSs. Students report that using this application increases their classroom engagement and supports the learning process. Instructors also find it a simple and useful method for increasing student active participation. When implemented effectively, this SRS can enhance students' learning experiences through best practices such as contingency teaching, knowledge scaffolding, formative assessment, and collaborative learning strategies (Wood et al., 2021b).

Research on formative assessment has been conducted by Zuhrieh A. Shana, who used Plickers as a formative assessment tool to improve learning in Primary Schools in the UAE. The results of this study recommend Plickers as a technology-based solution that can help teachers create a more engaging and enjoyable classroom atmosphere. In addition, the use of Pickers has also been shown to increase the level of student participation in the learning process (Shana & Abd Al Baki, 2020).

Based on the researcher's preliminary study by conducting discussions with lecturers of the Multimedia Innovation course for students of the 2023 intake of the Educational Technology Bachelor's program, it was found that there was a problem of academic cheating by searching for answers on the internet when conducting learning evaluation activities using evaluation tools in the form of Google Form. The students copied the questions from Google Form on AI (Artificial Intelligence), so that the answer to the question will appear. This is a form of academic cheating, so researchers have found a solution to this problem with a study entitled "Development of Assessment Technology Innovation To Reduce Academic Cheating". Researchers in this case created a solution by creating a new assessment tool by utilizing technological innovation in the form of QR cards in answering assessment questions using the application Plickers. The study aims to determine the procedures and feasibility of developing QR technology-based learning assessments as a learning technology innovation to be used as a learning assessment medium that can reduce academic cheating.

2. Method

Contains the type of research, time and place of research, targets/targets, research subjects, procedures, instruments, data analysis techniques, and other things related to the way of research that can be written in sub-subchapters, with sub-subheadings.

This research uses a development research method. (Research & Development). Development research is one of the applied fields of learning technology, which is a theory and practice in the design, development, utilization, management, and assessment of learning processes and resources (Richey & Seels, 1994).

This research procedure is based on the development model proposed by Thiagarajan, Semmel, and Semmel, which was chosen because of its suitability for developing learning products. In this study, the resulting product is an assessment medium utilizing QR code technology. The stages in this development model are arranged systematically and in detail, covering all aspects of the product development procedure (Gunawan et al., 2020). This development model is known as the 4D model, which consists of four stages: Define (Definition), Design (Planning), Develop (Development), and Disseminate (Spread).

This research begins with the stage Define (Definition), which aims to identify the main problems in learning and the necessary solutions. The problem found was academic cheating by students when using Google Form for assessment, where they copied questions from ChatGPT. Next, at the Design stage (Design), the researcher designed a product, namely QR-based formative assessment media, using an application. The assessment consists of 20 multiple-choice questions covering material from the multimedia innovation course, including an introduction to learning multimedia, learning multimedia theory, and principles of learning multimedia design. Development (Development) is divided into three steps: pre-production, production, and post-production. Pre-production includes preparing the tools and media to be used, production includes creating the assessment media product, and post-production includes expert appraisal (assessed by experts). Level disseminated (Distribution) includes validation testing (product trial), which is implemented on the actual target, and then measurements are taken to determine user responses to the feasibility and achievability of the product's objectives.

The subjects of this study were four classes of undergraduate students from Educational Technology, graduating class of 2023. Data collection techniques included a media expert validation questionnaire and a respondent questionnaire. The questionnaires were distributed to expert validators and students to determine the feasibility of the assessment media. The research instruments used were a validation sheet and a student response questionnaire. The data obtained were analyzed using descriptive quantitative methods.

The data is calculated using the following formula:

$$P = \frac{\Sigma x}{Sx_I} \times 100\%$$

Information:

P = Percentage

ΣX = Total score obtained

ΣX1 = Maximum score 100% = Constant

To determine the feasibility criteria for the developed assessment media product, the following product feasibility criteria are used according to Arikunto (2009):

Table 1. Product Eligibility Criteria

Eligibility Criteria (Percentage)	Validation Criteria
81% - 100%	Very worthy
61% - 80%	Worth it
41% - 60%	Quite decent
21% - 40%	Not feasible
0% - 20%	Totally unworthy

Source: Arikunto (2009)

3. Results and Discussion

3.1 Result

The result of this development is a formative learning assessment media with 20 questions that cover the main material previously covered in the multimedia innovation course, namely, material on introduction to multimedia, multimedia theory, and principles of multimedia learning design. The assessment media was created using the Plickers platform, which can be accessed using a laptop and a mobile phone connected to the same account. The laptop is used to create an account, create a class, create questions, share questions, download answer cards, and access assessment results. Meanwhile, the mobile phone is used to scan students' answers during the assessment activities. How this media works in the assessment activities: the teacher displays each question on a projector screen, then students answer the questions by holding up a printed card containing a QR code that differs from student to student. The teacher then scans the students' answers using a mobile phone to determine the answer that will appear on the phone screen, marked with a red mark for incorrect answers and, green mark for correct answers. The projector screen will display the names of students whose answers have been scanned. After the assessment is complete, each student's results can be viewed in the form of a score sheet containing their scores. This assessment tool can only be accessed online because the process uses a laptop platform integrated with a mobile phone to scan QR codes for answers, requiring a stable internet connection.

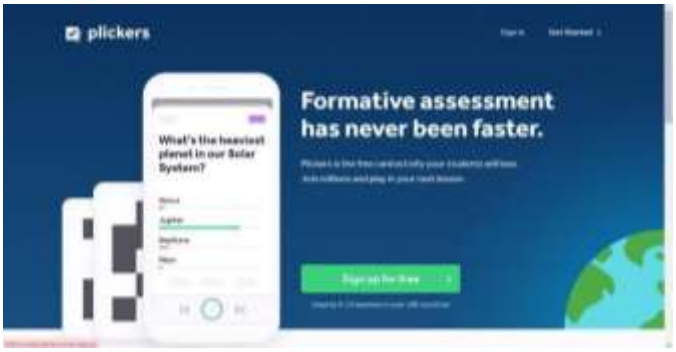

Figure 1. Initial View Of The Platform On The Laptop That Will Be Used To Create Assessment Media

Figure 2. Display Of The Class And The Names Of The Students Who Have Been Created

Figure 3. Display Of Inputted Assessment Questions

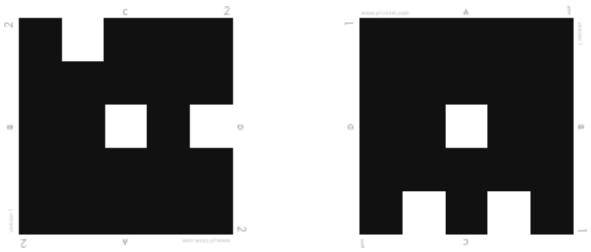

Figure 4. Display The QR Card To Answer The Assessment Questions

Figure 5. Product Trial In Assessment Activities

Furthermore, the developed assessment media product has gone through a validation process by media experts and student response questionnaires, which are presented in Tables 1 and 2.

Table 2. Media Expert Validation Results Data

No.	Assessment Aspects	Mean	P (%)	Category
1.	Design and interface (interface)	4	100	Very worthy
2.	Convenience	4	100	Very worthy
3.	Application usage and performance	4	100	Very worthy
4.	Usefulness and attractiveness	4	100	Very worthy
	Overall analysis	**4**	**100**	**Very worthy**

Source: Arikunto, 2009

Based on table 2, the results obtained with details of the overall assessment on the design and interface aspects (interface) obtained an average score of 4, the ease of use aspect obtained a score of 4, the application use and performance aspect obtained a score of 4, and the usefulness and attractiveness aspect obtained a score of 4. In accordance with the calculation of positive responses obtained from media experts, it can be stated that 100% of this assessment media is very suitable for use as a learning evaluation medium.

Table 3. Student Questionnaire Results Data

No.	Assessment Aspects	Mean	P (%)	Category
1.	Convenience of use compared to Google Form / conventional assessment media	4,06	81	Very worthy
2.	Ability to understand usage	3,77	76	Worth it

No.	Assessment Aspects	Mean	P (%)	Category
3.	Ability to reduce academic cheating	3,93	79	Worth it
4.	Interactivity of the learning atmosphere	4,23	85	Very worthy
	Overall analysis	**3,99**	**80**	**Worth it**

Source: Arikunto, 2009

Then, based on Table 3, the results of the student response questionnaire with a total of 121 students from 4 classes were obtained. The results of the answers with each aspect obtained a total average of 3.99, if presented as 80%. Based on the data analysis that has been done, it can be concluded that the innovative product of developing technology-based formative assessment media developed to reduce academic cheating is declared suitable for use as an evaluation medium in the learning process.

3.2 Discussion

Learning in the era of globalization requires teachers to utilize technology in the learning process, so they need to develop various strategies to adapt. Innovation in learning, including assessment activities, is crucial for improving the quality of education. Intentional changes made to improve existing conditions can be considered innovations that have a positive impact on the quality of life (Srilaksmi & Indrayasa, 2020). One indicator of educational success is the evaluation of learning outcomes, where every student naturally desires good grades as a measure of individual success. Various efforts are made to achieve satisfactory results, including academic cheating. Observations show that many teachers still use conventional methods, such as paper-based assessments and Google Forms, which risks increasing academic cheating through copying answers from friends or internet sources. Therefore, researchers are seeking a solution by developing innovative assessment media that utilizes technology.

A technology-based learning assessment media innovation product using QR was developed to assess its feasibility as an assessment medium that can reduce academic cheating. This development was carried out through systematic stages, starting with the definition phase, which included a needs analysis to determine objectives and relevant developments (Hannafin, 1989). In this study, the researcher conducted a needs analysis through discussions with lecturers of the Multimedia Innovation course to collect data on the context and existing problems. A preliminary study indicated the existence of academic cheating problems among undergraduate students in Educational Technology, class of 2023, which occurred when students searched for answers on the internet during evaluations using Google Forms, with some students known to copy questions from Google Forms and use an AI system to generate automated answers. As a solution, an innovative technology-based assessment tool was designed using an application. Plickers allows students to provide answers directly in real-time using different cards, so they don't have to search for information on the internet or copy other people's answers.

Design (Design) aims to design a product based on information obtained from the definition stage. The activities carried out by the researcher include designing a product in the form of QR-based formative assessment media using the application. This assessment tool is designed as an interactive response system that can be used when completing learning

assessments using mobile phones, computers, and cards equipped with QR codes (Çetin & Solmaz, 2017). As previously stated, this type of assessment tool provides accurate, reliable, and immediate feedback to students, which serves to guide them in the learning process. Furthermore, the ease of use of this application by students also has a positive impact on teachers (Crossgrove & Curran, 2008). Overall, many studies have shown a positive impact of this assessment tool, so researchers chose the Plickers application as a platform for product development.

The development project aims to produce a QR-based formative assessment tool using the Plickers application. This process begins with designing a user interface that is simple and easily accessible to educators and students. This product was evaluated by media experts to ensure the accuracy of card scanning and the display of assessment data. Compared to other student response systems (SRS), Plickers requires only one mobile device for teachers. During learning, students hold paper cards with square codes representing their answers, which are then scanned by the application to collect responses (Tompkins et al., 2018). This assessment tool is often used for formative assessment across various subjects and educational levels, supporting the creation of an interactive learning environment (Chng & Gurvitch, 2018). Based on expert feedback, the product was generally good in all aspects. The media expert feedback yielded 23 statements covering four aspects: design and interface (interface), the ease of use aspect, the application's use and performance aspect, and the overall usefulness and attractiveness aspects obtained a score of 4. From the value obtained, the product has a positive value with a percentage of 100% and is very suitable for use.

The product trial results obtained responses from 121 students, and the questionnaire received a positive response regarding the aspect of comfort of use compared to assessment media. Google Form/conventional, the ability to understand the use, the ability to reduce academic cheating, and the interactivity of the overall learning atmosphere obtained an average of 3.9 on a Likert scale of 1-5. If presented, it got a score of 80% and was suitable for use. Based on the results of the questionnaire, it was stated that 92.6% of the 2023 class of Educational Technology undergraduate students had never used this assessment media, which was proven to be an innovation in assessment activities. Then the ability of this assessment media to reduce academic cheating was proven by the results of the questionnaire, with 84.3% of students feeling that they did not have time to search for answers on the internet when using this assessment media.

Every system developed has its strengths and weaknesses (Rusmana & Kurniawarsih, 2020). Likewise, the development of QR-based assessment media has several strengths and weaknesses that need to be considered. Among the weaknesses is that this assessment media relies on the teacher's device, so students cannot access it directly. Furthermore, the limited number of questions is considered ineffective because the teacher expends extra energy scanning students' answers. Using this assessment media requires a stable internet connection, which may be a challenge in areas with inadequate technological infrastructure.

As for the advantages, it can increase student participation in the learning process, as shown in previous research (Sita et al., 2024). In addition, this application is easy to use and provides feedback. Plickers is also flexible and can be applied across various subjects and levels of education. As an example of previous research, Mariana Situmorang and Nani Mediatati (2023) stated that using QR codes as an assessment tool can reduce student cheating and improve classroom evaluation efficiency (Situmorang & Mediatati, 2023). Considering all these

advantages and disadvantages, this assessment tool can be an effective tool in improving learning quality if implemented appropriately.

4. Conclusion

Based on the description that has been presented, it can be concluded that the development of assessment media based on QR technology is an innovation as well as a solution to overcome problems in the use of QR-based assessments. Google Form to reduce academic cheating. Based on the results of the media expert validation test, this assessment media received a very appropriate category. Furthermore, based on the trial results, this assessment media received a very positive response from students. Students indicated that they felt more interested and the classroom atmosphere became more interactive when using this QR technology-based assessment media, and they felt there was no time to commit academic cheating when using this assessment media. With the development of QR-based assessment media, it is hoped that assessment activities will become more innovative and maintain their integrity. Hopefully, in the future, there will be innovations in the development of media for assessment activities.

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