



Implementation of Learning Media Development Based on Quick Response Code Using the Flipped Classroom Model

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Abstrak

Inovasi teknologi dalam pendidikan, seperti penggunaan model flipped classroom dan media pembelajaran berbasis Quick Response (QR) Code, dapat menjadi solusi untuk meningkatkan efektivitas pembelajaran. Penelitian ini bertujuan untuk mengembangkan media pembelajaran berbasis QR Code yang diintegrasikan dengan model flipped classroom. Metode penelitian yang digunakan adalah penelitian dan pengembangan (R&D) dengan subjek penelitian siswa kelas V di SDI Tanbihul Ghofilin Surabaya. Proses pengembangan media dilakukan melalui tahapan analisis, desain, pengembangan, implementasi, dan evaluasi, sementara data efektivitas media diambil melalui kuesioner dan tes hasil belajar. Hasil penelitian menunjukkan bahwa penggunaan QR Code dalam flipped classroom mampu meningkatkan keterlibatan siswa dan memberikan dampak positif terhadap hasil belajar mereka. Media pembelajaran berbasis QR Code efektif digunakan dalam model flipped classroom untuk mendukung proses pembelajaran yang lebih interaktif dan mandiri.

Kata Kunci: Media Pembelajaran, QR Code, Flipped Classroom

Abstract

Technological innovations in education, such as the use of the flipped classroom model and Quick Response (QR) Code-based learning media, can be a solution to increase learning effectiveness. This research aims to develop QR Code-based learning media that is integrated with the flipped classroom model. The research method used was research and development (R&D) with the research subjects being class V students at SDI Tanbihul Ghofilin Surabaya. The media development process is carried out through the stages of analysis, design, development, implementation and evaluation, while media effectiveness data is taken through questionnaires and learning outcomes tests. The research results show that the use of QR Codes in a flipped classroom can increase student engagement and have a positive impact on their learning outcomes. QR Code-based learning media is effectively used in the flipped classroom model to support a more interactive and independent learning process.

Keywords: Learning Media, QR Code, Flipped classroom

Introduction

The conventional education system implemented in many schools currently faces increasingly complex challenges. Classroom learning is often still focused on a teacher-centered approach, where the teacher is the only source of information, while students are more passive in the learning process (Sari & Punggeti, 2020). This makes learning less effective because students are not always actively

involved, and the material presented is often difficult to digest properly. Apart from that, limited time in class is also an obstacle in delivering in-depth material. As a result, students often have difficulty understanding concepts as a whole and only focus on memorizing.

As technology develops, education is required to innovate in its learning methods and media. Technology has changed many aspects of

life, including the world of education, which has increasingly opened up opportunities to create more interactive and flexible learning methods. Various digital applications and tools have been used in the learning process, facilitating student access to wider learning resources. The use of technology in education allows students to learn anytime and anywhere, adapting to their individual learning styles. This innovation is important to answer challenges in the digital era, where students are required to be more creative, critical and independent in learning (Faris, Saputro & Rubiati, 2024).

One learning method that is starting to be widely applied to increase learning effectiveness is the flipped classroom model. In this model, students are assigned to study material independently outside of class, for example through videos or reading materials, before then discussing it in more depth in class (Febrianto, Mas'udah & Megasari, 2020). This makes class time used more optimally for discussions, problem solving, or other practical activities. The flipped classroom model provides students with the opportunity to master the material at their own learning pace, as well as increasing their involvement in the learning process.

Flipped classroom is a learning model where the learning process that is usually carried out in the classroom, such as delivering material by the teacher, is moved outside the classroom through videos or reading material that is studied independently by students. In class, students use time for more active activities, such as discussions, problem solving, or collaborative projects. The basic principle of the flipped classroom is to maximize face-to-face time in class for interaction and deeper learning, while initial understanding of the material is done outside of class. This model aims to increase student involvement and make them more active in constructing knowledge, while providing teachers with the opportunity to provide more personal and effective guidance.

Apart from implementing the flipped classroom, QR Codes are also increasingly being used as a supporting tool in technology-based learning. QR Codes provide quick access to various digital learning resources such as videos, articles or practice questions. Students simply scan the QR Code with their device to get relevant additional material. QR Codes also make it easy for teachers to provide various types of varied and interactive learning materials, so that they can increase students'

learning motivation (Utami, Rantina & Edi, 2021). Integrating QR Codes in the flipped classroom model can be an innovative step in enriching student learning experiences.

QR Code is a type of matrix code or two-dimensional barcode that can store large amounts of data and be accessed quickly using devices such as smartphones or tablets. A QR Code consists of a pattern of black and white boxes arranged in a square shape, and the data contained in it can be text, URL, video, or other information. The basic concept of a QR Code is to make it easier for users to access information instantly by simply scanning the code via a digital device camera, without the need to type or search for information manually. QR Codes are widely used in various fields such as education, because they are easy to access, flexible and fast in distributing digital information.

Based on this background, there are important questions that need to be answered, namely how to develop QR Code-based learning media in the flipped classroom model. This research tries to answer this question by developing a learning media that utilizes QR Code as a supporting tool in the flipped classroom. This development is expected to increase the effectiveness of learning, both in terms of student involvement and their learning outcomes.

The aim of this research is to develop QR Code-based learning media that can be used in the flipped classroom model. This media is designed to be easily accessible to students and able to provide content that is relevant to their learning needs. By utilizing QR Codes, students are expected to be able to access learning materials independently, according to their respective schedules and abilities.

Apart from that, this research also aims to analyze the effectiveness of using QR Code-based media in the flipped classroom model. This was done to find out whether the use of QR Codes can increase student involvement in the learning process and have a positive impact on their learning outcomes. Evaluation of effectiveness is important to ensure that the media developed is not only innovative, but also truly beneficial for the learning process.

This research is expected to make a significant contribution to the world of education, especially in the development of technology-based learning media. By utilizing QR Codes in the flipped classroom, it is hoped

that a learning experience that is more interactive, flexible and in line with students' needs in this digital era can be created. This also helps teachers in designing more effective and efficient learning.

Ultimately, innovation in education is very necessary to answer the challenges of this modern era (Arsana, Suarjana & Arini, 2019). The use of technology such as QR Codes in the flipped classroom model is a form of innovation that can help create a more enjoyable and meaningful learning process for students. With this research, it is hoped that more innovations can be developed to support better education in the future.

Method

This research uses a Research and Development (R&D) approach to develop QR Code-based learning media that is integrated with the flipped classroom model. This development research aims to produce media that can be used in learning and test the effectiveness of the media. R&D was chosen because this approach involves systematic steps to design, develop, and evaluate learning media so that they suit student needs and learning objectives.

The development model used in this research is the ADDIE model which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation (Cahyadi, 2019). The Analysis stage involves identifying learning needs and student characteristics. At the Design stage, QR Code-based media planning is carried out, including the material presented and how the QR Code is integrated with the flipped classroom. The Development stage involves creating learning media, including preparing content and creating QR Codes for students to use. After that, at the Implementation stage, this media is applied in class to see how students use this media in the flipped classroom learning process. Finally, at the Evaluation stage, media effectiveness is evaluated through tests and questionnaires.

The research subjects were class V students at SDI Tanbihul Ghofilin Surabaya, who used QR Code-based learning media in the flipped classroom learning process. Subject selection is based on the relevance of the flipped classroom model to the age and education level of students, where they already have the ability to study independently and access technology.

The number of research samples was adjusted to the needs of the analysis, taking into account the diversity of student characteristics for more general results.

The instruments used in this research consisted of questionnaires and learning outcomes tests. A questionnaire was given to students to measure the level of engagement, comfort and ease of use of QR Code-based media in the flipped classroom. Apart from that, questionnaires are also used to get feedback from students regarding the quality of the learning media being developed. Learning outcome tests are used to measure increases in student achievement before and after using QR Code-based media, to assess whether the media is effective in increasing understanding of the material.

Data obtained from questionnaires and learning outcomes tests were analyzed using descriptive and quantitative analysis techniques. Descriptive analysis was used to describe students' perceptions regarding learning media and the flipped classroom model used, while quantitative analysis was carried out to test the effectiveness of the media in improving student learning outcomes. Statistical tests are used to see significant differences between learning outcomes before and after using QR Code-based media, so that it can be concluded whether the media is effective in improving the quality of learning.

Result and Discussion

QR Code-based learning media integrated with the flipped classroom model was successfully developed according to the stages of the ADDIE model. This media makes it easier for students to access learning materials independently by scanning QR Codes, which contain learning videos, articles and interactive exercises. In terms of effectiveness, the results of the questionnaire filled out by students show that this QR Code-based media is considered practical, interesting and able to increase learning motivation. In addition, the results of the analysis of student achievement tests show a significant increase in understanding of the material after implementing this media. Discussions in class become more in-depth and interactive, because students already understand the basic material before face-to-face meetings (Zein, 2016). Overall, QR Code-based learning media in the flipped classroom has proven

effective in increasing student engagement and learning outcomes, as well as maximizing the use of class time.

Media Development Results

The development of QR Code-based learning media is an interactive and flexible learning system, making it easier for students to access learning materials anytime and anywhere. This media is designed for use in a flipped classroom model, where students scan QR Codes available in textbooks, modules, or digital information boards to access multimedia content, such as explanatory videos, presentations, or additional reading material. Each QR Code is designed to connect directly to specific learning material, according to the topic being studied. This makes it easier for students to get further explanations outside of class, before having more in-depth discussions in class (Ismaraidha, 2021).

Apart from that, this learning media is also equipped with interactive exercises which can be accessed via QR Code. This exercise includes web-based quizzes that provide immediate feedback to students, so they can find out the extent of their understanding of the material they have studied. By using QR Codes, students can quickly move from one resource to another without having to search for them manually, which makes the learning process more efficient and enjoyable. This media content is designed in such a way as to be user-friendly and visually attractive, and adjusted to the level of difficulty according to the needs of students at certain educational levels (Prihantoro, 2011).

This media also makes it easier for teachers to manage the learning process. The QR Code that has been provided makes it easier for teachers to deliver material in a structured and in-depth manner. Teachers can monitor student progress by seeing the results of the exercises that students have done independently before face-to-face meetings. With this media, class time can be focused more on discussion activities, problem solving, or collaborative projects that deepen students' understanding. Overall, this QR Code-based learning media provides an innovative and efficient solution in supporting flipped classroom-based learning, increasing student engagement, and maximizing the use of technology in the learning process.

The implementation of QR Code-based learning media in the flipped classroom model is carried out through several structured stages. In

the initial stage, students are given an introduction to the use of QR Codes and how to access the material provided by scanning using a smartphone or other device. The teacher also explains how learning is organized, where students are expected to study the material first outside of class through videos or articles that are accessed via QR Code. In this way, students can prepare themselves before face-to-face sessions in class, so that class time is focused more on discussions and activities that involve in-depth understanding (Salsabilla et al., 2021).

During implementation in class, students show a higher level of engagement because they already have a basic understanding of previously studied material. QR Codes installed on various learning resources make it easier for students to access relevant content independently, both inside and outside the classroom. This makes learning more flexible and personal, because students can learn according to the rhythm and time they want (Miftah, 2013). In the classroom, the teacher acts as a facilitator who guides discussions, answers more in-depth questions, and directs students in solving complex problems based on the material they have studied.

This implementation also shows increased efficiency in the learning process. By using QR Codes, teachers can provide various additional learning resources without being limited to print media. Additionally, the results of interactive exercises accessed via QR Code provide immediate feedback, so teachers can monitor student progress before the class session begins. This makes it easier for teachers to design activities in class that are more appropriate to students' needs, overcome difficulties that arise, and improve overall understanding of the material (Kosim, 2008). The implementation of QR Code-based media has proven effective in supporting the flipped classroom, creating a more interactive and efficient learning experience.

Media Effectiveness Analysis

The use of QR Code-based learning media using the flipped classroom model significantly increases student involvement in the learning process. With this media, students are given the opportunity to access learning materials independently via digital devices, making it easier for them to learn at a speed and time that suits their individual needs (Mishra, Gupta & Shree, 2020). Student engagement increases

because they can directly interact with engaging content, such as videos, interactive quizzes, and reading materials, which not only makes the learning process more enjoyable, but also increases their curiosity and motivation to learn.

Using QR Codes also makes it easier for students to access information, so they are no longer limited to the material presented in class. Students become more proactive in seeking information and understanding concepts before face-to-face sessions, which prepares them to participate more actively in class discussions. The flipped classroom learning process, which utilizes QR Codes, encourages students to be more responsible for their own learning, making them more involved in class activities, such as questions and answers and group discussions, because they already have a better basis for understanding the material previously studied. (Greiff et al., 2014).

In addition, QR Code-based media makes it easier for students to get direct feedback through the interactive exercises provided. Students can measure their understanding and correct mistakes in real-time, encouraging deeper and more sustained engagement. The easy access to information that QR Codes offer also reduces boredom and increases students' focus, because they feel more empowered in the learning process. Overall, the use of QR Code-based media not only improves student engagement in the classroom, but also encourages active participation and improves the overall quality of learning.

Table 1. *Pre-Test and Post-Test Results*

No	Student Name	Pre-test	Post-test
1	Adel	86	89
2	Aditya Wahyu	85	89
3	Alpin	90	95
4	Diana	92	97
5	Firmansyah	79	85
6	Kasih Aulia	76	82
7	Kezia Anindita	81	86
8	M Alfarisi	80	85
9	M Dwi Riski	78	84
10	M Fajel	90	94
11	M Faki Maulana	90	93
12	M Hilmi	90	94
13	M Reno	80	83
14	M Roihan	90	95
15	M Syaifullah	72	77
16	Melisa Jannah	80	85
17	M Suidan	80	86

18	Rahmat S	73	84
19	Revan	51	55
20	S Shohibul R	63	68
21	Satrio	64	76
22	Sekar Ajeng	85	89
23	Siti Khotijah	83	88
24	Sulton	88	90
25	Ulfa Nur	77	84
26	Vara fauzana	75	80
27	Wildan	74	83
Total Scores		2152	2297

Table 1 reflects the pre-test and post-test results of a number of students involved in testing QR Code-based learning media using the Flipped classroom model. Each student is identified by name and indicates their pre-test and post-test scores. Analysis of this data provides a detailed picture of the increase in students' understanding after being involved in learning with QR Code media and the Flipped classroom model. This data is concrete evidence that the use of QR Code media and the Flipped classroom model can have a positive impact on students' achievement of understanding in PAI subjects at SDI Tanbihul Ghofilin Surabaya.

From the results of the total pre-test score of 2152 and post-test of 2297, it can be seen that overall, there has been an increase in students' understanding in PAI subjects after taking part in learning using the developed media. Most students showed an increase in scores from pre-test to post-test, which can be considered a positive indication of the effectiveness of the learning media. These results provide a valuable quantitative understanding of the extent to which the implementation of QR Code learning media and the Flipped classroom model contributes to increasing student understanding in PAI subjects at SDI Tanbihul Ghofilin Surabaya, with an analysis of the pre-test and post-test results as follows:

$$P = \frac{\text{Number of students who scored } \geq 75}{\text{Total number of students}} \times 100\%$$

$$p = \frac{25}{27} \times 100\%$$

$$p = 92,5\%$$

Data analysis shows that the percentage of learning success using QR Code media and the Flipped classroom model reached 92.5%. This percentage is calculated based on the number of

students who get a score equal to or exceeding 75 divided by the total number of students participating, then multiplied by 100%. With this percentage, the level of learning success can be categorized as very good. This analysis provides a positive indication that the use of learning media contributes effectively to students' achievement of understanding in PAI subjects. These results provide a strong basis for considering and applying this learning method more widely in the educational environment, with the hope of increasing the effectiveness of learning PAI subjects at SDI Tanbihul Ghofilin Surabaya.

The application of QR Code-based learning media in the flipped classroom model has been proven to be able to improve student learning outcomes significantly. Through easy and fast access to digital learning materials, such as videos, texts, and interactive exercises, students can study the material in more depth before face-to-face class sessions. This helps students to be better prepared and understand basic concepts before the discussion takes place (Mustafa, Hermandra & Zulhafizh, 2019). Thus, when in class, students can focus on developing deeper understanding through teacher-guided discussion or problem-solving activities, which ultimately contributes to improved learning outcomes.

In addition, QR Code-based media provides flexibility in the learning process, where students can repeat difficult material and access information at any time according to their needs. This process makes it easier for students to learn at their own pace, which ultimately increases mastery of the material. The feedback obtained through interactive exercises available in this medium also helps students understand their mistakes and correct them immediately. The increase in learning outcomes is also reflected in test results which show significant differences before and after using QR Code-based media, where students involved in this learning show consistent increases in scores (Hartoto, Mulyono & Syafutra, 2021).

Furthermore, the use of QR Codes in a flipped classroom encourages students to become more independent and responsible for their own learning process. Students who are used to studying independently before class are able to utilize face-to-face time more productively. They can participate in more meaningful discussions, ask questions about concepts they do not yet understand, and

collaborate with their friends in problem-solving activities (Muannas & Mansyur, 2020). With a better understanding of the material, students tend to achieve higher academic results, indicating that QR Code-based media is not only effective in increasing student engagement, but also has a significant positive impact on their academic achievement.

Conclusion

Conclusions from the development and implementation results of QR Code-based learning media in the flipped classroom model show that this media has succeeded in creating an interactive and effective learning experience. Through the use of QR Codes, students can access learning materials independently before face-to-face sessions, which prepares them to participate more actively in class discussions. The results showed that students were not only more involved in the learning process, but also showed significant improvements in understanding the material and academic achievement after using this media.

The effectiveness of QR Code-based learning media in improving the quality of learning can be seen from increased student engagement and positive learning outcomes. This media provides easy access and flexibility, making it easier for students to learn at an appropriate pace and repeat difficult material at any time. Additionally, the feedback obtained through interactive exercises helps students understand and correct their mistakes in real-time. Thus, the use of QR Code-based media in the flipped classroom model has been proven to not only increase student engagement and motivation, but also have a significant positive impact on their learning outcomes.

References

- Faris, A. M., Saputro, D. W., & Rubiati, D. (2024). Pengembangan Media Pembelajaran Math Card (Kartu Matematika) Dalam Pembelajaran Matematika Materi Eksponen, SPLDV, Aritmatika. *Bilangan: Jurnal Ilmiah Matematika, Kebumihan Dan Angkasa*, 2(4), 172–189.
- Arsana, I. K., Suarjana, M., & Arini, N. W. (2019). Pengaruh Penggunaan Mind Mapping berbantuan Alat Peraga Tangga Garis Bilangan terhadap Hasil Belajar

- Matematika. *International Journal of Elementary Education*, 3(2), 99–107.
- Cahyadi, R. A. H. (2019). Pengembangan Bahan Ajar Berbasis Addie Model. *Halaqa: Islamic Education Journal*, 3(1), 35-42.
- Febrianto, P. T., Mas'udah, S., & Megasari, L. A. (2020). Implementation of online learning during the covid-19 pandemic on Madura Island, Indonesia. *International Journal of Learning, Teaching and Educational Research*, 19(8), 233-254.
- Greiff, S., Wüstenberg, S., Csapó, B., Demetriou, A., Hautamäki, J., Graesser, A.C. & Martin, R. (2014). Domain-general problem-solving skills and education in the 21st century. *Educational Research Review*, 13(1), 74-83. Elsevier Ltd. Retrieved September 25, 2024 from
- Hartoto, M., Mulyono, D., & Syafutra, W. (2021). Pengembangan modul pembelajaran atletik berbantuan QR code. *Edu Sportivo: Indonesian Journal of Physical Education*, 2(1), 51–60.
- Ismaraidha, I. (2021). Pengaruh Penggunaan Lembar Kerja Siswa (LKS) Terhadap Prestasi Belajar Siswa pada Mata Pelajaran Pendidikan Agama Islam. *Al-Fikru: Jurnal Ilmiah*, 14(2), 100–107.
- Kosim, M. (2008). Ilmu Pengetahuan Dalam Islam (Perspektif Filosofis-Historis). *TADRIS: Jurnal Pendidikan Islam*, 3(2).
- Miftah, M. (2013). Fungsi, dan peran media pembelajaran sebagai upaya peningkatan kemampuan belajar siswa. *Kwangsan: Jurnal Teknologi Pendidikan*, 1(2), 95-105.
- Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International journal of educational research open*, 1, 100012.
- Muannas, M., & Mansyur, M. (2020). Model Literasi Digital untuk Melawan Ujaran Kebencian di Media Sosial (Digital Literacy Model to Counter Hate Speech on social media). *JURNAL IPTEKKOM Jurnal Ilmu Pengetahuan & Teknologi Informasi*, 22(2), 125-142.
- Mustafa, M. N., Hermandra, H., & Zulhafizh, Z. (2019). Teachers' Strategies to Design Media to Implement Communicative Learning in Public Schools. *Journal of Educational Sciences*, 3(1), 13-24.
- Prihantoro, R. (2011). Pengembangan Profesionalisme Guru Melalui Model Lesson Study. *Jurnal Pendidikan Dan Kebudayaan*, 17(1), 100-108.
- Salsabilla, U. H., Agustin, A., Safira, F., Sari, I., & Sundawa, A. (2021). Manfaat Teknologi Bagi Mata Pelajaran PAI di Masa Pandemi Covid-19. *Edunesia: Jurnal Ilmiah Pendidikan*, 2(1), 125–132.
- Sari, T., & Punggeti, R. (2020). Inovasi Kurikulum Berbasis Budaya Lokal di SDIT Al – Wathoniyah Pajagalan Sumenep. *Autentik: Jurnal Pengembangan Pendidikan Dasar*, 3(2), 108-125.
- Utami, F., Rantina, M., & Edi, R. (2021). Pengembangan lembar kerja anak menggunakan QR Code pada materi sains anak usia dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(3), 1976-1990.
- Zein, M. (2016). Peran Guru Dalam Pengembangan Pembelajaran. *Inspiratif Pendidikan*, 5(2), 274-285.