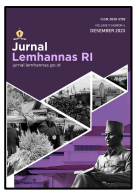

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Development of Archipelago Insight Lecture Media Based on QR Code to Improve Student Conceptual Understanding

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Abstract

Purpose: his study aims to develop and examine the feasibility and readability of QR Code-based Archipelago Insight lecture media for citizenship education lectures at the university level.

Study Design/Methodology/Approach: This research employed a research and development approach using the 4D model, consisting of the define, design, develop, and disseminate stages. The media were developed by organising Archipelago Insight materials into three main QR Code-based menus: meaning of words, definitions, and history. The developed product was assessed through feasibility testing by six validators and practitioners, consisting of two Archipelago Insight content experts, two civic education learning media experts, and two practitioners. A readability test was also conducted with 100 students as direct users of the media.

Findings: The feasibility assessment showed that the QR Code-based Archipelago Insight lecture media obtained an average score of 4.12, which was included in the feasible category. The highest feasibility score was found in the suitability of material with the media, while the lowest score was found in the clarity of material, although it remained within the feasible category. The student readability test obtained an average score of 3.63, which was included in the very feasible category. These findings indicate that the developed media are suitable, readable, and practical for use as an alternative medium in citizenship education lectures.

Originality/Value: This study offers QR Code-based Archipelago Insight lecture media as a practical digital alternative for presenting broad civic education materials. It also provides an initial basis for further studies on the role of QR Code-based media in supporting Archipelago Insight learning in blended and distance lecture contexts.

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INTRODUCTION

Education in Indonesia is one of the main pillars of national development. In recent decades, Indonesia has made considerable progress in expanding access to education and improving its quality. However, several challenges remain, particularly those related to students' access to learning resources and their understanding of important aspects of Indonesian culture, geography, history, and national identity, including the concept of Archipelago Insight (Sada et al., 2019). Archipelago Insight is an important concept in civic education because it introduces students to Indonesia as a diverse archipelagic state shaped by cultural, geographical, historical, and social plurality (Risnain, 2021). However, students' understanding of Archipelago Insight is not always evenly developed. This condition may be influenced by the quality of lecture materials, the teaching methods used, and the availability of accessible learning resources (Sur et al., 2018). Therefore, Archipelago Insight requires learning media that are not only informative, but also accessible, concise, and suitable for students' everyday digital learning habits.

One of the main challenges in Indonesian education is the unequal access to quality learning resources between urban and rural areas (Muttaqin, 2018). Students in remote areas often face difficulties in accessing textbooks, lecture materials, and adequate academic support. This situation may affect their opportunity to understand important concepts such as Archipelago Insight (Faragher, 2021). At the same time, developments in information and communication technology have opened new possibilities for delivering learning materials through mobile learning. Mobile learning utilises mobile devices, such as smartphones and tablets, to provide more flexible access to learning resources (Anshari, 2017). Through mobile learning, students can access materials beyond the limits of classroom time and space (Ally, 2014). In higher education, mobile learning has also been widely discussed as a flexible learning approach that can support student engagement, access to resources, and learning continuity when it is designed in accordance with pedagogical needs (Crompton & Burke, 2018; Talan, 2020).

Although the potential of mobile learning has been recognised, its effective implementation in Indonesia still faces several challenges. These include the availability of technological resources, the quality of relevant learning materials, and lecturers' readiness to integrate technology into learning practices (Rapanta et al., 2020). Another challenge concerns the availability of mobile devices, internet connections, and supporting infrastructure (Čolaković & Hadžialić, 2018). Even though smartphone use in Indonesia has increased, not all students have equal access to stable internet and well-designed digital learning materials (Azıonya & Nhedzı, 2021). Therefore, the quality of lecture materials remains a crucial issue. Learning materials need to be designed in line with curriculum objectives, students' needs, and the characteristics of the subject matter being taught (Davis et al., 2016). This is particularly relevant for Archipelago Insight, because the material covers broad and interconnected themes, including national identity, territorial unity, cultural diversity, citizenship values, and awareness of Indonesia's position as an archipelagic state.

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Previous research has shown that mobile learning can support student engagement and learning outcomes when it is carefully designed and implemented (Bouchrika et al., 2021; Wu et al., 2012). However, studies that specifically develop mobile-based media for Archipelago Insight in civic education remain limited. Existing studies tend to discuss mobile learning in general subjects or focus on broader aspects of online learning, rather than on the development of specific media for civic education materials related to Archipelago Insight (Rahiem, 2020). The complexity of Archipelago Insight, which involves cultural, historical, geographical, and social dimensions of Indonesia, makes it necessary to develop learning media that can present the material in a more accessible and structured form (Dabamona & Cater, 2019). For this reason, research on the development of QR Code-based learning media is important, especially because QR Codes can connect printed or visual materials with digital resources, multimedia content, and online information in a simple and practical way (Law & So, 2010; Durak et al., 2016).

A deep understanding of Archipelago Insight has important implications for the formation of national identity, multicultural awareness, and appreciation of Indonesia's cultural heritage (Fatmawati, 2021). In civic education, this understanding is not merely related to memorising concepts, but also to developing students' awareness of unity, diversity, and citizenship responsibility. However, before a learning medium can be claimed to improve students' conceptual understanding, it must first be developed and tested for its feasibility, readability, and suitability for use in the learning context. By examining the feasibility and readability of a QR Code-based medium, this study provides an initial foundation for further research on its effectiveness in supporting students' conceptual understanding of Archipelago Insight.

By utilising mobile technology, QR Code-based Archipelago Insight lecture media can provide students with easier access to learning materials. The QR Code format enables students to scan and access additional explanations, digital content, or relevant online resources through their smartphones. The use of this medium may also support more interactive civic education lectures, as students are encouraged to engage with learning materials in a more flexible manner (Hanif et al., 2018; Onyema et al., 2019). Unlike conventional lecture materials that rely mainly on printed texts or slide presentations, QR Code-based media can bridge classroom explanation and independent learning by providing immediate access to supporting content. Therefore, this study focuses on developing QR Code-based Archipelago Insight lecture media that are easy for students to operate and suitable for use in civic education lectures at the university level. Specifically, this study aims to determine the feasibility and readability of the developed media as an initial step before future studies examine its effectiveness in improving students' conceptual understanding.

LITERATURE REVIEW

Mobile Learning

Mobile learning refers to a learning approach that uses mobile technologies, such as smartphones, tablets, and other portable devices, to enable students to access, interact

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with, and participate in learning activities (Keengwe et al., 2014). The main characteristics of mobile learning include flexibility, accessibility, interactivity, personalisation, connectivity, and the use of multimedia content (Grant et al., 2019). One of its key strengths is flexibility, as students can access lecture materials anytime and anywhere, without being strictly limited by classroom space and scheduled learning time (Sarrab et al., 2016). This condition allows students to learn at their own pace and according to their learning preferences.

Another important feature of mobile learning is accessibility. Since smartphones are widely used by students, mobile learning can provide easier access to learning materials, digital resources, and learning activities (Teri et al., 2014). This may support more inclusive learning practices, particularly when the materials are designed to be simple, accessible, and compatible with students' digital habits. Through mobile applications, platforms, or other mobile-based tools, students can interact with learning content, lecturers, and peers more directly (Prestridge, 2014). This interaction can create a more dynamic learning experience and may support students' engagement with the material.

In higher education, mobile learning has been widely discussed as a learning approach that can support flexible access, student engagement, and learning continuity when it is integrated with appropriate pedagogical design (Crompton & Burke, 2018; Talan, 2020). However, mobile learning should not be understood merely as the use of smartphones in the classroom. Its effectiveness depends on the suitability of the content, the clarity of the learning flow, the accessibility of the medium, and the extent to which the technology supports the intended learning objectives.

Mobile learning also offers opportunities for personalisation. By utilising adaptive learning features or structured digital resources, students may receive learning content that is more relevant to their level of understanding and learning needs (Jagušt et al., 2019). Connectivity is also an important characteristic of mobile learning, as students can access lecturers, peers, and online learning resources through internet-connected mobile devices (Schuck et al., 2017). This enables collaboration, online discussion, and access to broader learning resources (Ahmad, 2024). In addition, mobile learning often uses multimedia content to enrich the learning experience. Through videos, animations, images, and interactive materials, students can encounter concepts in more varied and engaging ways (Sajid et al., 2016). For civic education, this characteristic is important because abstract concepts such as national identity, territorial unity, diversity, and citizenship awareness need to be presented in ways that are clear, contextual, and accessible to students.

Quick Response Code (QR Code)

Quick Response Code, commonly known as QR Code, is a two-dimensional matrix code used to store information in the form of square visual patterns that can be scanned using electronic devices such as smartphones or tablets (Sun et al., 2021). QR Codes consist of black and white patterns arranged geometrically in a rectangular grid (Peng et al., 2019). One of their main characteristics is the ability to store various types of

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information, including text, URLs, contact information, and digital data. QR Codes are also known for their speed and ease of use, as users can scan them with a smartphone camera and directly access the information embedded in the code (Chang et al., 2021).

QR Codes also have a high level of redundancy, meaning that they can still be read even when part of the code is obstructed or damaged (Chen, 2017). This characteristic allows QR Codes to be used in different situations and environments, including learning spaces where printed and digital materials need to be connected. In educational contexts, QR Codes can function as a bridge between physical learning materials and digital resources. They can be placed in textbooks, worksheets, posters, slides, or learning modules to provide instant access to additional explanations, videos, websites, or other online resources (Mogali et al., 2019; Rabu et al., 2019).

The educational value of QR Codes lies in their ability to simplify access to digital content. Instead of requiring students to type long links or search for materials manually, QR Codes allow students to access relevant resources immediately through scanning. Previous studies have shown that QR Codes can be used to support learning activities, improve access to supplementary resources, and increase the practicality of technology-supported learning (Law & So, 2010; Durak et al., 2016).

In the context of lecture media, QR Codes can increase accessibility and interactivity because students can move quickly from printed or visual materials to digital content (Lin & Teng, 2018). This is especially useful when learning materials contain complex concepts that require supporting explanations or examples. For Archipelago Insight materials, QR Codes can be used to connect students with explanations of key terms, definitions, historical contexts, visual materials, and other supporting resources. Therefore, QR Code-based media are relevant for civic education because they can help lecturers organise broad and multidimensional content into a more accessible learning format.

Civic Learning

Civic learning is a conceptual foundation that explains how individuals acquire the knowledge, skills, values, and attitudes needed to participate effectively in the political, social, and cultural life of society (Reichert & Print, 2018). One theory often associated with civic learning is social learning theory, which emphasises that individuals learn through experience, observation, and interaction with their social environment (Adha et al., 2019). This means that civic knowledge and skills are developed not only through formal instruction, but also through students' engagement with social values, public issues, and collective life.

Moral development theory is also relevant to civic learning because it explains how individuals develop moral reasoning and responsibility as members of society (Sumardjoko & Musyiam, 2018; Tan et al., 2018). Civic learning helps students internalise democratic values, justice, responsibility, tolerance, and respect for diversity. In addition, constructivist learning theory is important because it views students as active participants who construct knowledge through interaction, reflection, discussion, and exploration of different perspectives (Retnawati, 2020; Chuang, 2021). This perspective

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is relevant to Archipelago Insight because students need to understand Indonesia's diversity not only as factual information, but also as a civic reality that shapes national unity, social responsibility, and collective identity.

Social psychology also contributes to civic learning by explaining how individuals are influenced by social norms, group perceptions, identity formation, and social interaction (Hassan, 2017; Schröder et al., 2016). Through civic learning, students are expected to understand their role in society, develop empathy, appreciate cultural diversity, and participate responsibly in public life. Therefore, civic learning requires media that can present civic concepts in a meaningful and accessible way. QR Code-based media can support this need by providing students with direct access to contextual materials and supporting resources related to civic identity, diversity, and national awareness

Archipelago Insight in Civic Education

Archipelago Insight is an important concept in Indonesian civic education because it introduces students to the idea of Indonesia as a unified archipelagic state with diverse geographical, cultural, social, and historical characteristics (Risnain, 2021; Mukri & Waspiah, 2023). In the context of citizenship education, Archipelago Insight is not only a geographical concept, but also a civic and geopolitical perspective that strengthens students' awareness of national unity, territorial integrity, cultural diversity, and responsibility as citizens (Fatmawati, 2021; Nadia et al., 2025).

The teaching of Archipelago Insight requires learning materials that are structured and accessible because the concept covers several interconnected dimensions, including territorial unity, national unity, cultural unity, historical awareness, and civic responsibility (Salamah et al., 2024; Ratih & Najicha, 2021). Students need to understand not only the definition of Archipelago Insight, but also its historical background, meaning, relevance to national identity, and implications for civic life. Therefore, lecture media should help students navigate these dimensions in a clear and practical manner. QR Code-based media are suitable for this purpose because they can organise different types of content into accessible digital links, allowing students to explore key concepts step by step (Law & So, 2010; Durak et al., 2016).

Conceptual Understanding and Media Feasibility

Conceptual understanding refers to students' ability to understand the meaning, relationships, and application of concepts rather than merely memorising definitions (Hiebert & Lefevre, 1986; Kilpatrick et al., 2001). In the context of Archipelago Insight, conceptual understanding involves students' ability to connect the meaning of Archipelago Insight with Indonesia's identity, diversity, geography, history, territorial unity, and civic responsibility. However, the present study does not directly measure students' conceptual understanding through pre-test and post-test procedures. Instead, it focuses on developing QR Code-based media and examining their feasibility and readability.

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For this reason, feasibility and readability are important early stages in media development. In educational design research, the quality of a developed learning product is commonly examined through validity, practicality, and effectiveness; expert judgement and user responses are often used in the early stages to determine whether a product is suitable for further implementation (Nieveen, 1999; Plomp & Nieveen, 2013). A learning medium needs to be considered feasible by experts and practitioners before it can be used more widely in classroom practice. Likewise, readability testing is needed to determine whether students as direct users can understand, access, and use the media properly. The results of feasibility and readability testing can provide an initial foundation for future studies that examine the effectiveness of the media in improving students' conceptual understanding

METHODS

This research employed a research and development approach by applying the 4D development model, consisting of define, design, develop, and disseminate stages (Murtiyasa, 2020). In the define stage, information and literature relevant to mobile learning, QR Code-based media, and Archipelago Insight materials were collected and reviewed. In the design stage, Archipelago Insight materials were selected, organised, and arranged into a lecture media format suitable for civic education. The developed media consisted of three main menus: meaning of words, definitions, and history, each of which was connected to QR Code-based access. In the develop stage, QR Codes were created and inserted into the media as links between learning materials and supporting digital resources. The developed media were then assessed through feasibility testing by validators and practitioners and readability testing by students. The disseminate stage was conducted through academic dissemination, including seminars, journal publication, and other scholarly platforms.

The participants in this study consisted of two groups. The first group comprised six validators and practitioners who assessed the feasibility of the QR Code-based Archipelago Insight lecture media. They consisted of two Archipelago Insight content experts, two civic education learning media experts, and two practitioners. The validators were selected using purposive sampling based on their expertise and experience in validating civic education learning products, teaching Archipelago Insight in higher education, and implementing technology-integrated civic education learning (Etikan et al., 2017). The second group consisted of 100 students from the Faculty of Aerospace Technology, Adisutjipto Institute of Aerospace Technology, Yogyakarta, in the 2021–2022 academic year. They included 56 students from the Department of Aerospace Engineering and 44 students from the Department of Mechanical Engineering. These students were selected using purposive sampling because they had studied Archipelago Insight materials, had experience using various learning models and media, and had received civic education learning integrated with learning technology, including QR Codes (Sibona et al., 2020).

Data were collected using two questionnaires: a feasibility assessment questionnaire for validators and practitioners and a readability response questionnaire for

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students. The feasibility questionnaire assessed the suitability of the material with the media, the smoothness of the learning flow, the clarity of the material, the ease of media use, and the interactivity of the lecture media. The student readability questionnaire assessed learning or chapter content, audiovisual display, and software engineering aspects to determine whether the media could be accessed, read, and operated properly by students (Yuan et al., 2021). The data were analysed descriptively by organising the scores for each component, calculating the average score, and interpreting the results based on product feasibility criteria (Adelia et al., 2023). The ideal mean was calculated using 1/2 × (maximum ideal score + minimum ideal score), while the ideal standard deviation was calculated using 1/6 × (maximum ideal score − minimum ideal score) (Sarkar et al., 2016). The media were considered feasible when the results of the feasibility assessment and student readability test reached at least the feasible category can be seen in Table 1.

Table 1. Product feasibility criteria

No.	Score Range	Category
1.	$X > \bar{X}_i + 1.8 \times Sd_i$	Very Feasible
2.	$\bar{X}_i + 0.6 \times Sd_i < X \leq \bar{X}_i + 1.8 \times Sd_i$	Feasible
3.	$\bar{X}_i - 0.6 \times Sd_i < X \leq \bar{X}_i + 0.6 \times Sd_i$	Moderate
4.	$\bar{X}_i - 1.8 \times Sd_i < X \leq \bar{X}_i - 0.6 \times Sd_i$	Unfeasible
5.	$X \leq \bar{X}_i - 1.8 \times Sd_i$	Very Unfeasible

Note. X refers to the empirical score, $\bar{X}i$ refers to the ideal mean, and SDi refers to the ideal standard deviation. The interpretation of feasibility and readability scores was conducted according to the scale used in each instrument.

RESULT AND DISCUSSION

Result

Display of Archipelago Insight Media Based on QR Code

In the QR Code-based archipelago insight learning media, there are 3 menus, namely the Meaning of Words menu, the Definitions menu, and the History menu. In the Word Meaning menu, when the button is pressed a display will appear next to the main menu in the form of an explanation of the meaning of words from Archipelago Insight. In this display, there is also a QR Code button which, when pressed, will display a QR Code from the Word Meaning menu. The menu display can be seen in Figure 1. In the scanned QR Code image a web search button and share button will also appear.

Figure. 1. The menu displays the meaning of words

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Figure. 2. Display of QR code scan results meaning of words

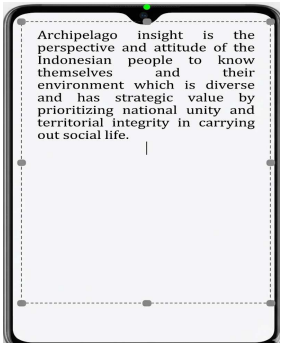

Figure. 3. Search engine page from web search button

The QR Code that appears on the Meaning of Word display menu when scanned using the QR and Barcode application will display explanatory information about the meaning of words from Archipelago Insight as seen in Figure 2. In the Definition menu, when the button is pressed, a display will appear next to the main menu in the form of an explanation of the definition of the archipelago. In the display, there is also a QR Code button which when pressed will display the QR Code from the Definition menu. The QR Code that appears on the Definition display menu when scanned using the QR and Barcode application will display explanatory information about the definition of archipelago insight.

In the History menu, when the button is pressed, a display will appear next to the main menu in the form of an explanation of the history of the Archipelago. In the display, there is also a QR Code button which when pressed will display the QR Code from the History menu. QR Code that appears on the History display menu when scanned using the QR and Barcode application will display explanatory information about the history of the archipelago. In the scanned results of each QR Code image, a web search button and a share button will also appear. If the web search button is pressed, it will directly connect to the Google search engine page as seen in Figure 3, and if the Share button is pressed, the user or user can choose to share the scan results to the user's social media account.

The Feasibility Results of Archipelago Insight Media Based on QR Code

This research explores the use of QR Code applications in citizenship courses in the Indonesian archipelago insights chapter. QR Code-based Archipelago Insight Lecture Media offers a multifaceted lecture approach that combines image, sound, and text media. Furthermore, QR Code-based Archipelago insight lecture media has been developed in

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this research and carried out a feasibility test. This was done before lecture media was widely used. The feasibility test for this QR Code-based Archipelago insight lecture media was carried out by validators, and practitioners, and supported by direct testing of use by students. The results of the feasibility test for the QR Code-based Archipelago insight lecture media component include indicators of compatibility of material with the media, smooth flow of lectures being developed, clarity of material in the media, ease of use of the media, and interactivity of the lecture media can be presented in Table 2.

Table 2. Results of the feasibility test for QR code-based archipelago insight lecture media

No.	Aspect	Score	Category
1.	Suitability of material with media	4.25	Feasible
2.	Smooth flow of lectures	4.17	Feasible
3.	Clarity of material in the media	4.00	Feasible
4.	Ease of use of media	4.05	Feasible
5.	Lecture media interactivity	4.13	Feasible
Average Score		**4.12**	**Feasible**

The results of the feasibility test for QR Code-based Archipelago insight lecture media obtained an average score of 4.12 which is included in the feasible category. Based on the feasibility criteria for development products presented in Table 2, it can be stated that the QR Code-based Archipelago insight lecture media developed is in the appropriate category or suitable for use. QR Code-based Archipelago insight lecture media is suitable for citizenship education lecture activities in universities. The aspect of assessing the feasibility of the QR Code-based Archipelago insight lecture media that received the lowest score was the aspect of clarity of material in the QR Code media of 4.00. Meanwhile, the aspect of feasibility assessment that received the highest score was the aspect of suitability of the material with the media at 4.25.

After obtaining the feasibility test results from validators and practitioners, the next step is to analyze the results of the student usage test. The use test or readability test of the QR Code-based Archipelago insight lecture media component was carried out by 100 students from the Department of Aerospace Engineering and Department of Mechanical Engineering, Faculty of Aerospace Technology, Adisutjipto Yogyakarta Institute of Aerospace Technology. Students involved in this readability test phase have studied Archipelago insight material during citizenship education lectures. Furthermore, the results of the QR Code-based Archipelago insight lecture media readability test carried out by students can be displayed in Table 3.

Table 3. Results of readability test of QR Code-based Archipelago insight lecture media

No.	Aspect	Score	Category
1.	Learning or chapter	3.51	Very Feasible
2.	Audiovisual display	3.42	Very Feasible
3.	Software engineering	3.97	Very Feasible
Average Score		**3.63**	**Very Feasible**

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Based on Table 3, it can be seen that the readability test results for QR Code-based Archipelago insight lecture media obtained a score of 3.63. This shows that the QR Code-based Archipelago insight lecture media is included in the very feasible category and is suitable for use as a variation of the archipelago insight lecture media in interactive citizenship education lectures. The results of the readability test of the QR Code-based Archipelago insight lecture media carried out by students strengthen the feasibility of the product being developed as one of the choices of Indonesian archipelago media in citizenship education lectures. If the results of the readability test and feasibility test of the QR Code-based Archipelago insight lecture media are combined, a score of 3.88 is obtained which is included in the feasible category. QR Code-based Archipelago insight lecture media from assessments carried out by validators and students has been proven to be one of the archipelago insight lecture media in citizenship education lectures that is appropriate and feasible to be applied in citizenship education lectures about Archipelago insight.

Discussion

This research and development study was conducted to develop QR Code-based Archipelago Insight lecture media for civic education in higher education. The development of this media was based on the problem that Archipelago Insight materials are rarely integrated with QR Code-based lecture media in higher education (Aisiah et al., 2023). In addition, Archipelago Insight is often considered a complex topic because it covers broad and varied materials that require sufficient time to understand (Suratno, 2012; Petchey et al., 2018). Therefore, this study developed a technological lecture product by integrating QR Codes into Archipelago Insight materials. The product developed in this study should be understood as an alternative lecture medium designed to support access to materials, not as a medium that has already been proven to improve students' conceptual understanding.

QR Code technology was selected because it provides practical access to digital learning resources through smartphones. QR Codes have been widely applied in various sectors, although their use as lecture media still requires further development in educational contexts (Azizah et al., 2022; Uçak, 2019). In this study, QR Code-based Archipelago Insight lecture media were designed to connect students with learning materials through several menus, including word meaning, definitions, and historical explanations. This design is relevant because QR Codes can bridge printed or visual lecture materials with digital content, making supporting materials easier to access (Law & So, 2010; Durak et al., 2016). The media also combine text, images, and digital access, which may support a more varied learning experience when the content is clearly organised (Ahmad et al., 2020; Mayer, 2024).

The feasibility test showed that the QR Code-based Archipelago Insight lecture media obtained an average score of 4.12, which falls into the feasible category. This result indicates that the media were considered suitable by validators and practitioners in terms of material suitability, learning flow, clarity of material, ease of use, and interactivity. These aspects are important in assessing the quality of learning media because media

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feasibility should consider both content relevance and technical usability (Agustina et al., 2021). The highest score was found in the suitability of material with the media, namely 4.25, indicating that Archipelago Insight materials were considered appropriate to be presented through QR Code-based media. Meanwhile, the lowest score was found in the clarity of material, namely 4.00, although it remained within the feasible category. This means that the media are already suitable for use, but the clarity of explanation, visual arrangement, and student instructions can still be improved.

The readability test involving 100 students produced an average score of 3.63, which was categorised as very feasible. The components assessed in this readability test included learning or chapter content, audiovisual display, and software engineering (Gerbier et al., 2018). This result suggests that students as direct users were able to access, read, and operate the media properly. The combined score of 3.88 further supports the conclusion that the QR Code-based Archipelago Insight lecture media are suitable for use in civic education lectures. In educational design research, feasibility and practicality are important early stages before a learning product is tested for effectiveness (Nieveen, 1999; Plomp & Nieveen, 2013). Therefore, the findings of this study should be interpreted as evidence of media feasibility and readability.

These findings are in line with previous studies showing that technology-based and smartphone-supported learning media can provide flexible access to learning materials and support learning activities when they are designed according to pedagogical needs (Hasbi et al., 2020; Pedro et al., 2018; Crompton & Burke, 2018; Talan, 2020). In the context of civic education, QR Code-based media can help lecturers organise broad Archipelago Insight materials into more accessible learning components. Previous studies also indicate that QR Code-based media can support learning efficiency and provide practical access to supplementary materials (Herpratiwi & Adha, 2022; Traser et al., 2015). However, this study does not claim that the media directly improve students' understanding, motivation, or curiosity because those variables were not measured through pre-test, post-test, or specific motivation instruments.

The use of QR Code-based Archipelago Insight lecture media may also help lecturers deliver materials through different lecture models, including face-to-face, blended, and distance learning contexts (Hava et al., 2018; Başarır, 2017). Nevertheless, lecturer guidance remains important so that students do not merely scan and read the materials, but also discuss, interpret, and relate Archipelago Insight to civic life, national identity, and social responsibility. This point is important because civic education is not only concerned with the delivery of information, but also with the formation of civic knowledge, values, and participation (Nanggala et al., 2020).

This study has several limitations. First, it only examined feasibility and readability, so it did not measure the effectiveness of the media in improving students' conceptual understanding. Second, the readability test was conducted in one institution and involved students from two departments, which may limit the generalisability of the findings. Third, this study did not directly examine students' motivation, engagement, or long-term retention after using the media. Therefore, future studies should use experimental or quasi-experimental designs to examine the effect of QR Code-based Archipelago Insight

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lecture media on students' conceptual understanding, learning engagement, and civic education outcomes.

Overall, the findings indicate that the QR Code-based Archipelago Insight lecture media are feasible and readable for use in civic education lectures. The media provide a practical way to connect students with supporting digital materials and help lecturers present Archipelago Insight content in a more accessible format. However, further research is needed before stronger claims can be made about the effectiveness of the media in improving students' conceptual understanding.

CONCLUSION

This development research seeks to offer an alternative solution for citizenship education lectures in the Archipelago Insight chapter, particularly through the development of QR Code-based lecture media. The solution offered in this study is the production of QR Code-based Indonesian Archipelago Insight lecture media that are feasible and readable for use in civic education lectures at the university level. The developed media were assessed by validators, practitioners, and students through feasibility and readability testing.

The results of the feasibility assessment by validators and practitioners showed that the QR Code-based Archipelago Insight lecture media obtained an average score of 4.12, which was included in the feasible category. This indicates that the media were considered suitable in terms of material relevance, learning flow, content clarity, ease of use, and interactivity. Furthermore, the readability test involving 100 students obtained an average score of 3.63, which was included in the very feasible category. These findings show that the developed media can be accessed, read, and operated properly by students as direct users.

Therefore, QR Code-based Archipelago Insight lecture media can be considered a practical and useful alternative medium for civic education lectures in higher education. The media provide added value by connecting students with supporting digital materials through smartphones and by helping lecturers present Archipelago Insight content in a more accessible format. However, this study only examined the feasibility and readability of the developed media. It has not yet measured the effectiveness of the media in improving students' conceptual understanding through pre-test and post-test procedures. Therefore, further research is needed to examine the impact of QR Code-based Archipelago Insight lecture media on students' conceptual understanding, engagement, and civic education learning outcomes.

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