

Development of Monopoly Media Assisted by QR Code: Cultural Diversity of Java Island in Class IV IPAS Learning

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Abstract. Learning media currently plays an important role in making learning activities more active, interesting, and enjoyable, especially when used in elementary schools. However, learning science in grade IV at SDN Jatibarang 03, Semarang City, has limited teaching media because teachers tend to use lecture and discussion methods. As a result, students' motivation and understanding are less than optimal, and learning is less than optimal. This study aims to produce learning media in the form of a QR Code-assisted Monopoly game exploring Java Island for the subject of Science and Mathematics, specifically the material on cultural diversity for fourth grade elementary school students. The research was carried out based on the Research and Development (R&D) method. The research design was based on the ADDIE development model, which consists of five tags, namely analysis, design, development, implementation, and evaluation. Validity testing was carried out by subject matter and media experts, while the trial was applied to 20 students and fourth-grade teachers. Studies show that the media obtains a suitability score of 96% from the subject matter and media experts' assessment, with a category of "Very Suitable". In addition, the results of the teacher and student response questionnaires showed scores of 100% and 99.5% with a rating of "Very Good". With this in mind, the QR Code-assisted monopoly game exploring Java Island was deemed suitable for use in supporting IPAS learning in grade IV at SDN Jatibarang 03.

Keywords: Development; Learning Media; Monopoly; IPAS; QR Codes

1. Introduction

Education is currently one of the main foundations in preparing the nation's next generation, because it not only equips students with knowledge and skills but also forms values and character. According to Robandi and Ibrahim (2018) in Farid et al., (2023), education is one of the important assets that is at the forefront of shaping the nation's next generation. In every country, including Indonesia, there is a system that regulates the continuity of education. This system serves as a guideline for implementing all educational activities in Indonesia in the form of a curriculum. Thus, the curriculum plays a strategic role as one of the important components in the implementation of education. According to Cholilah et al., (2023), the curriculum is a complex system with the function of directing the entire learning process, from beginning to end, and is the center of education that needs to be updated through creative renewal and able to adapt to the dynamics of the era's development. The Independent Curriculum contains lesson content that its unique identity lies in the content of Natural and Social Sciences (NSS) lessons by combining material from Natural Sciences (NS) and Social Sciences (SS). The science material is presented in eight chapters, which are divided equally between four science chapters and four social studies chapters.

According to Dona and Alfin (2023), science is a scientific study that discusses living things and their interactions with the environment and the universe, for example, humans who are living creatures and cannot live alone. Thus, science in elementary schools can be understood as a basic subject that examines aspects of social life in society, including in the current era. According to Neneng et al., (2023) that the existence of science subjects can reduce the burden in pursuing material and learning outcomes, so that teachers can have more time to facilitate students to explore through various interesting learning models and methods. In addition, science is indeed needed by students in today's era, so that students are always

accustomed to balancing activities between protecting and preserving nature with an attitude of sympathy and empathy towards other humans. It is hoped that it will not only provide a series of materials, but also equip them with social insights that can be applied in everyday life. Through science learning, it is hoped that it can increase students' attention and social sensitivity, especially in life in society and in society. As stated by Suhelayanti et al. (2023) in Syerilla et al., (2025), through NS, it is hoped that students will be more familiar with Indonesia's wealth and use this knowledge to preserve and develop the natural environment.

Entering the 21st century, the development of digital technology is increasingly closely linked to the world of education. Learning in schools today is required to focus not only on delivering material but also on integrating technology to make it more interactive and aligned with the needs of a generation familiar with the digital world. This condition has fostered awareness of the urgency of digital literacy, including in the educational context (Musa et al., 2022). The use of digital learning media acts as a strategic tool capable of creating a more engaging, effective learning experience that aligns with the needs of today's generation. One form of this technology utilization is the use of Quick Response (QR) Codes as supporting media. According to Salma Farichatus et al., (2024), innovative learning media using QR Codes can address the challenges of using technology in education, helping students achieve learning objectives and is designed for application by teachers in the technological era, which can be used in various learning activity scenarios in schools.

Based on observations, questionnaires, and interviews with teachers at SDN Jatibarang 03 Semarang City, students showed a low level of activity and interest in learning, especially during the final class period, resulting in decreased concentration and some students chatting among themselves during the learning process. Students also had difficulty understanding the science and science material contextually because learning was not supported by adequate visual media, so they needed learning media that were interesting, colorful, varied, and involved games and interactive activities. On the other hand, teachers still predominantly used lecture and discussion methods, with limited attention to all students during the learning process, and conveyed the need for interactive learning media to increase student activity and understanding. During classroom learning, the available learning media were also limited, which resulted in a learning process that tended to be passive.

1.1. Problem Statement

Media is important in learning, especially when associated with fun games like Monopoly and supporting media like QR Codes, which contribute to the learning process for students while also facilitating teachers in delivering lesson materials. According to Anang Silahuddin (2022), media was initially viewed solely as a visual aid to help teachers explain complex concepts. Over time, media has evolved beyond mere complements and become a crucial component, clarifying material and motivating students. Incorporating QR Codes into learning media is one way to integrate technology into learning. QR Codes are considered an innovative alternative that can support 21st-century learning, as they enable the practical and interactive integration of digital materials (Vawanda & Zainil, 2020).

Teachers face time constraints in designing learning media and a limited availability of learning media in schools, particularly to support science and science learning. Teachers' tendency to use lecture and discussion methods results in students lacking motivation and interest in actively participating in classroom learning. According to Wigianti et al., (2021), the teacher-centered learning process and the limited use of learning media in delivering material leads to low student interest and activity in teaching and learning, resulting in poor learning outcomes.

Thus, the research conducted to address the data problem shows that teachers need learning media that can help foster an active learning environment, thus the learning process is more effective, students can more easily understand the material presented, and can present learning innovations by using digital media that adapt to the needs of students in the current era, one of which is in the form of QR Code-assisted monopoly media because the media is

game-based, digital-based, and makes it more appropriate to the needs and characteristics of elementary school students in the current era.

1.2. Related Research

Relevant research was conducted by Aslam et al., (2021), which showed that the development of this monopoly media is to improve students' understanding of social studies subject matter, using the 4D model for the needs of learning media that attracts interest in learning while playing, the Monopoly Smart Games media makes students happy and interested in using the media.

This research was conducted by Azighah et al., (2023), which showed to develop monopoly learning media for plant propagation material. The use of learning media adapted to student characteristics is a solution to stimulate students' high level of activity and curiosity and it is hoped that monopoly learning media can become educational learning media and facilitate students' learning needs.

This research was conducted by Permatasari, (2024), which showed who developed a mathematics monopoly media based on student teams achievement divisions. Developing a monopoly game into a learning medium is expected to enable students to understand the material being taught by the teacher through a fun game, thus providing a new atmosphere in the classroom, and is expected to foster a sense of togetherness and cohesiveness in a team.

Based on the three research studies, it is concluded that first, previous research in general scale IPAs material and for this research is more focused on cultural diversity intended to introduce the culture of Java in grade IV IPAs material. Second, previous research did not use technology in the use of learning media and this research develops the use of technology in the form of *qr codes*. Third, previous research did not use technology, different teaching materials, and learning processes for students with student teams achievement divisions, while this research uses *3D qr code technology*, focuses on IPAs about cultural diversity, learning processes with activities to further explore technology with barcode scanning experiences and by implementing cooperative learning based on interactive learning media. Therefore, this research attempts to fill these limitations by developing learning media designed according to the characteristics of the material and class being studied.

Based on this, the learning media innovation in this study integrates 3D depiction and QR code technology. 3D visualization is used as a form of presentation of learning materials with objects that can be seen in shape, while the QR code functions as a quick access to the presentation of the material, a guidebook for using monopoly media, and scanning of 3D material objects. This integration aims to increase activeness, new experiences for scanning QR Codes, understanding of the material, and collaboration between students in cooperative learning.

1.3. Research Objectives

Developing and producing monopoly learning media assisted by QR codes to help foster an active and enjoyable learning environment, making it easier for students to understand the diversity material on the island of Java, and making the science learning process more effective and in accordance with the needs of student characteristics.

The purpose of this study is to analyze the development process and assess the feasibility of learning media in the form of a monopoly media to explore Java Island assisted by QR codes in the subject of social studies, cultural diversity material, grade IV, chapter 6 about Indonesia is rich in culture, topic B, the richness of Indonesian culture through the form of learning achievements in which students include an understanding of the diversity of a culture, local wisdom, history (both figures and periodization) in the province where they live and the ability to relate it to the context of life today. This is designed to be able to help students and teachers in the learning process.

2. Theoretical Framework

2.1. Learning Media Theory

Learning media plays a crucial role in supporting the success of the teaching and learning process. Media not only serves as a tool but also as a means of creating an engaging, interactive, and meaningful learning environment.

According to Arsyad and Azhar as cited in Husna (2023), learning media is a component of learning resources or physical vehicles that contain instructional materials that can stimulate students to learn. According to Syaiful and Azwan as cited in Daihratri (2022), learning media is any tool that can be used as a message channel to achieve learning objectives. According to Reiser and Dempsey as cited in La Abute (2023), learning media is physical equipment such as books, visual aids, computers, and others that are used to present learning to students. According to Latuheru (1998: 14) in Harahap (2022), learning media is a tool, material, or technique used in the learning process so that students can follow the learning well.

According to Sri et al. (2025) learning media is an interesting and creative item used in the learning process involving students and teachers, as a path for delivering material that was initially passive to active, and makes students play an active role in every learning activity. According to Afifah & Hartatik (2019), Safitri et al., (2018), Susilawati et al., (2021) as cited in Aulya et al. (2021), that learning media that is collaborated with games has the advantage of making the learning atmosphere fun and can make students active so that it is easy to understand the concept of the material. From the several opinions above, it can be concluded that learning media is something used by teachers in delivering lessons to students to be a learning resource, a teaching aid so that learning can create a fun atmosphere and motivate active learning processes in the classroom.

2.2. Monopoly Theory

Monopoly is a form of educational game that can be used as a learning tool. This game serves not only as a form of entertainment but also as an effective learning tool because it contains interactive, competitive, and collaborative elements that can increase student motivation.

According to Nurmalia et al., (2022), monopoly game is a game played by more than two people and emphasizes mastering the materials to be taught by the teacher. This game is modified into a fun learning medium to support learning so that students can understand the material to be taught by the teacher, and monopoly media is preferred by students for learning.

According to Alfauziah et al., (2023), monopoly media can involve students and teachers in an active role, making students more active during the learning process, not passive during learning. According to Mersela et al., (2023), monopoly game media is a visual and motion game media in the form of a board with squares containing main tasks and cards containing questions about students, which aims to increase self-confidence without reducing the meaning of the game itself.

Based on the opinions above, it can be concluded that the Monopoly game as a learning medium is an innovation that can transform the learning environment into a more engaging and enjoyable one. Through play-while-learning activities, students become more active, motivated, and easily understand the material presented by the teacher.

2.3. QR Code Theory

The use of digital-based learning media, leveraging technological advancements, will become a key learning strategy in the 21st century (Rahma et al., 2023). Similarly, the use of technology-assisted learning media, such as QR codes, is an alternative solution to support 21st-century learning. QR codes can be used as a technology-based learning medium (Vawanda & Zainil, 2020).

QR Codes are two-dimensional, allowing them to contain larger amounts of data. QR (Quick Response) is a two-dimensional barcode that translates data quickly through a smartphone

camera. QR Codes are also used to assist education, particularly in school learning activities, but they have not yet been fully implemented (Utami & Utami, 2023). The hope is that QR Codes can facilitate educational environments and stimulate students' curiosity. Furthermore, using QR Codes allows students to access learning materials more quickly and conveniently. However, how they respond to using this medium in their learning will depend largely on the comfort and convenience they experience (Afianti et al., 2024).

Based on the above opinion, it can be concluded that QR Code can be a useful alternative source in the 21st century, can collaborate with technology-based media, can be easily used by students and teachers in the current era because everyone can use gadgets that all groups can easily access, QR code is used by scanning on the device camera will immediately display the product or learning media presented, with the QR code it can be easier to use digital-based media that is in accordance with the technological era, fast and practical. Media that is interesting, different, and tied to the era of technology can make students more enthusiastic in learning, and reduce the lag in access to technology in the modern era.

3. Method

3.1. Research Design

This research was conducted using the Research and Development (R&D) method. This research design is guided by the ADDIE development model which includes 5 phases, namely: (1) analysis, at this stage the researcher determines the problems that need to be solved by identifying the needs related to the product to be developed, (2) design, at this stage the researcher determines the design of the product to be developed, (3) development, at this stage the researcher develops a product that refers to predetermined criteria, (4) implementation, at this stage the researcher uses the developed product as an answer to existing problems, and (5) evaluation, testing the feasibility and assessing the product until completion (Siti Patonah et al., 2024).

3.2. Respondent

This study involved the participation of 4th grade elementary school homeroom teachers and 20 students of SDN Jatibarang 03 Semarang city. The use of sampling using Census sampling technique or total sampling where all members of the population were sampled with a total of 20 4th grade elementary school students. With the addition of one homeroom teacher, to fill out the needs questionnaire in the pre-research and also to fill in the response to the learning media after being used in the study, whether there are deficiencies in the learning media used by the Java Island monopoly media bear assisted by QR codes or is it suitable for use. The characteristics of the research respondents are presented in Table 1.

Table 1. Respondent Characteristics

Characteristics	Category	Frequency	Percentage (%)
Gender	Male (student)	17	65.4
	Female (student)	9	34.6
Gender	Male (teacher)	1	3.8

3.3. Data Collection

In conducting research, data collection is an important thing to do. To collect the necessary data, researchers use several research methods, with observation activities being a data collection technique by observing the learning process in the classroom. Observations conducted at SDN Jatibarang 03 observed the learning process in grade IV in science lessons. Interviews are a data collection method that will be carried out by communicating directly between the questioner and the resource person. In this study, interviews were conducted with the homeroom teacher and the method of delivery in the teaching and learning process. The research questionnaire for expert testing was compiled based on the media research

instrument grid. The questionnaire was given to material experts and media experts to find out the assessment and suggestions as a basis for revising the product so that researchers could determine the feasibility of the product that had been made. After that, the questionnaire was also given to students to determine the students' responses to the product that had been developed.

Interview results indicate that in science teaching, particularly in cultural diversity, teachers still use the lecture method, with students being less active and having difficulty understanding the material contextually due to the lack of visual media. Furthermore, teachers need innovative, engaging, and easy-to-use learning media to increase student interest and engagement.

Classroom observations revealed that some students lacked focus during the learning process, particularly during the final period. Students appeared passive, less engaged in discussions, and exhibited low interest in learning. This situation was reinforced by the finding that the learning media used were not varied and did not support contextual learning.

The results of the teacher needs assessment show that teachers need interactive, contextual learning media that are appropriate to the characteristics of elementary school students in order to increase student activity and understanding, and the assessment table regarding teacher needs, presented in Table 2.

Table 2. Results of Teacher Needs Analysis

No	Teacher Needs Indicators	Yes	No
1	Suitability of science learning with the curriculum	100	0
2	The effectiveness of current science learning	100	0
3	The need to use innovative learning media	100	0
4	The importance of game-based learning media	100	0
5	Approval of the development of roaming monopoly media	100	0

Meanwhile, the results of the student needs assessment showed that many still experience difficulties in learning science, there is no use of game-based learning media, more enthusiasm for learning with learning media, easier understanding of the material through playing while learning, and agree with the use of the game Monopoly in science learning. The following are the results of the student needs questionnaire presented in Table 3.

Table 3. Results of Student Needs Analysis

No	Student Needs Indicators	Yes (%)	No (%)
1	Having difficulties in learning science	80	0
2	Not yet using game-based learning media	80	0
3	More enthusiastic about learning with learning media	70	0
4	It's easier to understand the material by playing while learning	80	0
5	Agree that science learning uses the monopoly game	80	0

3.4. Data Analysis

This development research used two data analysis techniques, namely qualitative descriptive analysis and quantitative descriptive analysis. Data from interviews, observations, and questionnaires related to student and teacher needs were processed using a qualitative descriptive analysis approach to sort information, find patterns, and identify significant things, which can then be used as a basis for research. Questionnaires for media validation, material validation, teacher responses, and student responses were processed using a quantitative descriptive analysis method to assess the suitability of the media based on assessment scores from media experts, material experts, class teachers, and students.

The questionnaire used a Likert scale. Researchers used a questionnaire to validate the materials and media in order to obtain assessments from material and media experts regarding the validity of the learning media that had been developed. The teacher needs analysis questionnaire consisted of closed and open questions. Researchers used this questionnaire to investigate teacher needs based on actual situations. Student needs analysis was in the form of closed questions. This questionnaire was used to examine what students needed. The teacher response questionnaire was arranged in the form of a checklist using a Likert scale, while the student response questionnaire was recorded in a checklist using a Guttman scale. The teacher response questionnaire and student responses were used by researchers to understand the reactions of teachers and students after they saw and used the monopoly learning media that had been developed.

4. Findings

QR Code-assisted monopoly learning media was developed using the Canva application and discusses content related to "Exploring Java Island, Cultural Diversity material for Grade IV." This finding was implemented based on the R & D research method according to ADDIE by creating a learning product.

4.1. Analysis

Researchers conducted a preliminary study at SDN Jatibarang 03 through observation, distributing needs questionnaires to teachers and students, and conducting interviews with teachers. The following preliminary study findings were obtained:

Students who lack focus during lessons, for example, engage in behaviors that are unsupportive of learning, such as chatting among themselves. Furthermore, limited teacher attention during instruction seems to make the learning process difficult to achieve, and the limited use of learning media available in the classroom makes it easier for students to become bored.

The learning carried out is limited to lecture and discussion methods, there is no variation in other learning methods, and there is no support or limited learning media available in the classroom, especially in the science subjects.

There are obstacles that students experience in learning activities, including a lack of understanding of the material presented, difficulty in maintaining focus and minimal student activity during the learning process.

4.2. Design

The researchers designed the media components, including a 70 x 70 cm game board, designed using the Canva application with images of Betawi, Badui, Javanese, and Sundanese cultures, as well as other supporting images. The game cards and pawns were designed using Canva with images of traditional clothing from the selected Javanese tribes. A guidebook is also available at the link: <https://online.fliphtml5.com/kkmkp/wurf/>. The guidebook is illustrated in Figure 1.



Figure 1. Guidebook

And here is the cartoon design used in Figure 2.



Figure 2. Card Design

4.3. Development

Researchers materialize the design into a real product which is then validated by material and media experts, with a score assessment based on the Likert scale in Table 4.

Table 4. Media Suitability Assessment Scores based on the *Likert Scale*

Score	Criteria
5	Very Worthy
4	Worthy
3	Quite Decent
2	Less than worthy
1	Not feasible

Source: Nisa' & Julianto (2020) in Salma et al., 2024

The obtained scores were then converted into percentages for quantitative analysis using the following formula (Kolifatun Nisa et al., 2024):

$$P = \frac{\sum x}{\sum xi} \times 100 \%$$

Information :

P = Percentage

$\sum x$ = Total respondent scores

$\sum xi$ = Ideal score total

100% = Constant

The results of the percentages obtained are then categorized based on media suitability criteria as shown in Table 5.

Table 5. Media Eligibility Criteria

Percentage (%)	Criteria
81% - 100%	Very Worthy
61% - 80%	Worthy
41% - 60%	Quite Decent
21% - 40%	Less than worthy
0% - 20%	Not feasible

The assessment indicators used by subject matter experts are listed in Table 6, while the media expert assessment indicators are presented in Table 7.

Table 6. Subject Matter Expert Instruments

No.	Indicator	Skor	
		Expert 1	Expert 2
A.	Compliance indicators		
1.	Compliance with CP (Learning Outcomes)	5	5
2.	The material used is in accordance with the independent curriculum	5	5
3.	Ease of understanding the material	5	5
B.	Presentation indicators		
4.	All the information presented in media learning is clear.	5	4
5.	Instructions for using the media are clear	5	5
6.	Regularity of arrangement of the material presented	4	4
7.	Creating play-while-learning activities	5	5
8.	Completeness of information in the media used	5	5
C.	Linguistic indicators		
9.	The language in the media is easy to understand	5	5
10.	Conformity to using good and correct Indonesian language rules	4	4
11.	The sentences used are simple (easy to understand)	5	5
12.	Effective and efficient use of language	5	4
D.	Visual display		
13.	Ease of understanding images and videos in media	5	5
14.	Clarity of the letters used	5	5
E.	Competency indicators		

15.	Learning materials using QR code-assisted media can increase students' understanding of concepts	4	4
Total		72	70
Total max 75			
Percentage :			
Expert 1 :	$\frac{72}{75} \times 100 = 96$		
Expert 2 :	$\frac{70}{75} \times 100 = 93$		
Criteria :	Very Worthy		

Table 7. Media Expert Instruments

No.	Rated aspect	Skor	
		Expert 1	Expert 2
A. Presentation aspects			
1.	The monopoly learning media used is neat in layout	5	5
2.	The selection of font type and size is appropriate	5	5
3.	The image, text and video sizes are appropriate	5	5
B. Aspects of suitability			
4.	Suitability of learning media to the characteristics and needs of students	4	4
5.	The media used is relevant to the topic being taught	5	5
6.	Suitability of media to the desired objectives	5	4
C. Innovation aspects			
7.	Media shows innovative or novel elements	5	5
8.	Media can increase students' learning motivation	5	4
9.	Media allows for two-way interaction (students and media/teachers)	5	4
D. Feasibility aspects			
10.	The media used are practical in the learning process	5	5
11.	Media can be used repeatedly	4	4
12.	Media is appropriate to use during the learning process	5	5

E. Size according to learning environment

13. The media has good quality	5	5
14. Media size according to classroom conditions	5	4
15. The media used is easy to carry and store	4	4
Total	72	68

Total max 75

Percentage :

Expert 1 : $\frac{72}{75} \times 100 = 96$

Expert 2 : $\frac{68}{75} \times 100 = 90$

Criteria : Very Worthy

The following validation results are presented in Table 8.

Table 8. Expert Validation Results

Validator	Percentage (%)	Criteria
Media Expert 1	96	Very Worthy
Media Expert 2	93	Very Worthy
Subject Matter Expert 1	96	Very Worthy
Subject Matter Expert 2	90	Very Worthy

4.4. Implementation

Researchers conducted a field trial that demonstrated high student enthusiasm for using the QR code-assisted Monopoly learning media for cultural diversity. Questionnaires were distributed to teachers and students to gauge their responses to the media. The following shows the results of the questionnaire in Table 9.

Table 9. Respondent Questionnaire Results

Respondents	Number of Respondents	Percentage(%)	Criteria
Teacher	1	100	Very good
Student	20	99.5	Very good

The results of the teacher response questionnaire are based on the indicators and statements in Table 10.

Table 10. Teacher Response Questionnaire

No	Indicator	Skor
A. Content Suitability		
1.	Suitability of learning materials with learning outcomes	5

2.	Suitability of learning materials with learning objectives	5
3.	The material presented is clear, simple language and easy for students to understand.	5
4.	The material covers the cultures that exist on the island of Java in a representative manner.	5
5.	The presentation of the material is done creatively and innovatively through games and the use of QR code technology.	5
6.	The material is related to everyday life, especially the culture in the surrounding area.	5
7.	The use of illustrations and visuals in the material helps in understanding cultural diversity.	5
8.	Illustrations and visuals on the monopoly board and QR code help students understand cultural diversity more easily.	

B. Media Suitability

1.	The media presented has clear and attractive images and displays.	5
2.	Media presented with text in the form of clear explanations	5
3.	The media is easy to use by both teachers and students in learning activities.	5
4.	The use of media helps teachers deliver science material more effectively and enjoyably.	5
5.	The use of media helps students understand cultural differences around them.	5
6.	The use of media provides motivation for students to focus and be enthusiastic when participating in learning.	5
7.	The media is equipped with game instructions and a clear guide on how to use the QR code	5
8.	The media presented encourages active involvement and collaboration among students.	5
9.	Media encourages cultural understanding through a combination of games and QR code technology.	5
10.	The media components (boards, cards, points, and guidebooks) are arranged completely and neatly.	5
11.	The media is strong and durable enough to be used in repeated learning processes	5

Total

Total max : 95

Percentage : $\frac{95}{95} \times 100 = 100$

Criteria : Very good

The results of the student response questionnaire are based on the indicators and statements in Table 11.

Table 11. Student Response Questionnaire

No.	Question	Skor
1.	I am interested in innovative learning media such as monopoly exploring the island of Java using a QR code with illustrations (interesting pictures)	20
2.	I can understand the lessons taught through the monopoly of exploring the island of Java with the help of a QR code easily	19
3.	I felt happy in the learning experience with monopoly exploring the island of Java with the help of a QR code	20
4.	I feel that monopoly media for exploring the island of Java with the help of QR codes is suitable for use in learning	20
5.	I am more active in learning with the monopoly media of exploring the island of Java with the help of QR codes	20
6.	I can increase my creativity with monopoly media exploring the island of Java with the help of a QR code	20
7.	I am interested in the visual display in Monopoly which discusses the cultural diversity that exists on the island of Java.	20
8.	I find it easy to use the learning media for exploring the island of Java as a monopoly.	20
9.	I feel that the media monopoly on exploring the island of Java can help in understanding the culture that exists around us.	20
10.	I feel my abilities have increased because I learned with this fun media.	20
Total		199
Total max : 200		
Percentage : $\frac{199}{200} \times 100 = 99,5$		
Criteria : Very good		

These results were tested using a percentage formula based on the assessment scores based on the Likert Scale as in Table 4 and Table 5.

Then, for the student response instrument, calculations were carried out based on the percentage formula and a reliability test was carried out, as follows.

With the KR-20 Reliability formula

$$r_{11} = \left(\frac{k}{k-1} \right) \left(\frac{St^2 - \sum pq}{St^2} \right)$$

Information:

r_{11} = overall test reliability.

p = proportion of subjects who answered the item correctly

q = proportion of subjects who answered the item incorrectly ($q = 1-p$)

k = number of items

St = standard deviation of the test

With reliability interval.

Reliability Interval	Criteria
0.80-1.00	Very high
0.60-0.80	Tall
0.40-0.60	Currently
0.20-0.40	Low
0.00-0.20	Very Low

Produce the following values from the results of student responses.

Total Variance	0.05
KR-20	0.81633
Criteria	Tall

4.5. Evaluation

The evaluation phase was conducted to assess the strengths and limitations of the QR Code-based Monopoly learning media developed based on expert validation and user feedback. Overall, the evaluation results indicated that the media was feasible and effective for use in elementary school learning. One of the main strengths of the developed media is its ability to increase student engagement and motivation through game-based learning activities. The integration of QR Codes allows students to access learning materials interactively, making the learning process more enjoyable and meaningful. In addition, the media design and content organization were deemed appropriate and easy to use by both teachers and students. However, several limitations were identified during the evaluation process. Some students required guidance when using the QR Code feature for the first time, and minor revisions were needed in terms of font size and color contrast to improve readability. Based on feedback from experts and users, revisions were made to improve the clarity of instructions and enhance the media's visual appearance. Overall, the evaluation results confirmed that the QR Code-assisted Monopoly learning media can support active learning and can be used as an alternative learning medium in science instruction in elementary schools.

5. Discussion

The discussion of the research results that have been conducted on the Monopoly Island Exploration Learning Media that uses QR codes and is designed as a tool to support the delivery of cultural diversity material in the fourth grade Science subject refers to the ADDIE development model which includes the following stages:

5.1. Analysis

At this stage, researchers collected data through observation, interviews, and questionnaires to determine the needs of students and teachers in the teaching and learning process in the classroom. Based on the analysis of preliminary study data, the use of learning media in the classroom is very lacking, not only that but also from the school is still limited. From the interviews not only the teacher's method but the teacher's ability seems to be quite difficult in making media including concrete and related to current technology that is at the top of the time to make, so that learning media for subjects such as science is very necessary. Thus, it will be very necessary for innovative teaching and learning media and not only interesting for learning motivation and student interest but also to help the problems experienced by teachers, one of the media is media about the monopoly of cultural diversity material in science subjects. According to (Ilham et al., 2024), there are various factors that cause learning difficulties, such as varying cognitive abilities, lack of motivation can also have a significant impact on students' learning abilities, unsupportive learning environment factors, such as non-conductive classes or

teaching methods or media that do not suit students' learning styles, lack of adequate support tends to feel alienated and less motivated to learn.

5.2. Design

At this stage, the researchers designed and developed learning media for the Nusantara Exploration Monopoly, which included a game board, playing cards, a guidebook, and pieces. All visual components were designed using the Canva application and then translated into physical media. Canva was chosen because it facilitates the efficient design process for learning media and produces attractive and easy-to-understand visual displays, thus supporting the use of digital technology in learning (Jannah et al., 2023).

The game board is designed to measure 70 × 70 cm and is made of 3 mm thick plywood for strength and group use. The relatively large board size was chosen to ensure visual readability by all students from various class perspectives. This aligns with the principle of visual integration in Mayer's multimedia learning theory, which emphasizes the importance of presenting organized and relevant visual elements so that they can be processed efficiently by students (Mayer, 2021).

The game board layout consists of 24 systematically designed squares, including challenge squares, surprise squares, quick quizzes, cards, and city icons. The use of red and white with bold lines serves as visual markers to direct students' attention to important elements of the game (Mayer, 2021).

A variety of game box types are designed to create an active and contextual learning experience. Challenge boxes, quick quizzes, and surprises serve as stimuli and light evaluations, while additional boxes such as free parking, prison, and stars provide a fun game element. This design aligns with the concept of game-based learning, which shows increased student engagement, motivation, and competence through elements of challenge, rules, and feedback within the learning context (Safitri et al., 2025). Furthermore, embedding QR codes in some boxes serves as a means of enriching the material, allowing students to access additional information independently without overloading the main game board display. Thus, cognitive load theory provides guidelines to support the way information is presented that influences student activities and can optimize their intellectual understanding (Sweller et al. (1998) as cited in Riya et al (2020)).

The game cards and pieces were also designed using Canva with a simple and relevant visual appearance. The game pieces were made from cartoon-style illustrations of traditional clothing and printed on buffalo paper and laminated for durability. The cartoon illustrations were selected to suit the characteristics of elementary school students to increase interest and engagement in learning. The game cards consist of challenge cards, surprise cards, learning cards, and help cards, each with a different function. The learning cards, equipped with QR codes, allow students to access additional materials independently and contextually, supporting information processing without creating excessive cognitive load (Rakha, 2025). Meanwhile, the help cards are designed to encourage group collaboration and social interaction among students.

In addition to the game's main components, a media usage guidebook was also developed, designed using Canva and published via FlipHTML5. This guidebook serves as an operational guide for teachers and students to ensure systematic and directed media use. The guidebook's development adheres to instructional design principles, particularly the Gagné model, which emphasizes clarity of learning objectives, activity steps, and feedback throughout the learning process (Gagné et al., (2005) as cited in Ahyar et al. (2023)).

In addition, there is a guidebook designed using Canva and then linked in FlipHTML5, used as a guide for the use and operation of the monopoly learning media, which can be accessed via the following link: <https://online.fliphtml5.com/kkmkp/wurf/>

5.3. Development

At this stage, researchers developed the designed media and implemented it in physical form according to the plan. The developed learning media products were then validated by media

experts and subject matter experts to determine the feasibility of the QR code-assisted Java Island exploration media for the fourth-grade elementary school science (IPAS) subject on cultural diversity.

The validators consisted of two media experts (lecturers at PGRI Semarang University) and two material experts (teachers at SDN Jatibarang 03). Media Expert 1, Mr. Choirul Huda, obtained a score of 96% in the "Very suitable" category, with a note that information on the size of the Monopoly media needs to be added. Media Expert 2, Mr. Sudarto, a fourth-grade teacher, obtained a score of 93% in the "Very suitable" category, with no notes indicating that the media is ready to be implemented. Meanwhile, for material experts, Material Expert 1, Mr. Choirul Huda, obtained a score of 96% in the "Very Good" category, with a note that learning videos need to be included in the teaching materials. Material Expert 2, Mr. Eka Aditya Lutfian, obtained a score of 90% in the "Very Good" category, with a note that quizzes need to be added to the teaching materials.

Based on Table 8, the validation results from experts indicate that the Monopoly Explore Java media has high quality in terms of appearance, content integration, and ease of use. Overall, this media received a "Very Suitable" rating from media experts and material experts. This demonstrates that media design that integrates visual elements, games, and digital technology is able to attract attention and increase active student participation.

These results align with research conducted by Nurhasanah and Lestari (2021), which states that interactive game-based media can improve students' concentration and memory of learning materials. Furthermore, the use of QR codes allows for the integration of multimedia materials such as videos and interactive quizzes, supporting the principles of blended learning, consistent with Prasetyo's (2020) opinion that combining physical and digital media can create a more contextual and enjoyable learning experience for elementary school students.

As an illustration, the validated media can be seen in Figure 3, Figure 4, and Figure 5.



Figure 3. Outer Monopoly Media



Figure 4. Internal Monopoly Media



Figure 5. Card

Furthermore, these findings demonstrate that the use of interactive media integrated with digital technology can meet the needs of 21st-century learning, particularly in science, technology, engineering, and mathematics (STEM) learning. Game-based media such as Monopoly make students more active, cooperative, and enthusiastic during the learning process. These findings align with Ninawati's (2021:36) opinion that game-based media can improve student motivation and learning outcomes. Furthermore, Abd Ghofur (2020) emphasized that integrating QR codes through learning cards in learning media has proven effective in increasing student learning motivation.

5.4. Implementation

At this stage, a trial of the implementation of learning media at SDN Jatibarang 03 using the Java Island exploration monopoly media assisted by QR codes in learning activities. The implementation was carried out on August 20, 2025, involving 20 fourth-grade students as research subjects. The learning implementation process was adjusted to the learning tools from the teaching module, and at the stage of using learning media, it began with delivering the material as a brief overview, then dividing the group, explaining the use of the media, applying the media to students starting with reading the guidebook opening by scanning the code image contained in the monopoly "start" section, then reading the material from scanning the learning cards with time given for students to understand the material, and the application of the media as a whole accompanied by researchers.

The implementation process demonstrated high enthusiasm and active participation from students throughout the learning process. After the trial was completed, researchers distributed questionnaires to teachers and students to obtain feedback on the effectiveness and appeal of the media used.

Based on the results presented in Table 9, this learning media received a "Very Good" rating from both teachers and students. Meanwhile, students demonstrated high interest, active engagement, and motivation during the lesson.

Furthermore, teacher responses indicated that this media was efficient and engaging, and facilitated teachers' explanations of cultural diversity more concretely. These findings support Silahuddin's (2022) assertion that learning media plays a crucial role in clarifying concepts and creating meaningful learning. This ensures clear concepts and meaningful learning, enhancing student experience and understanding of the material.

Overall, the use of the Monopoly Explore Java media has significantly contributed to improving the quality of science and science learning. This media helps students understand cultural diversity in a fun way, while also supporting the implementation of the Independent Curriculum, which emphasizes active, creative, and contextual learning. The following is the implementation of the media in Figure 6.



Figure 6. Implementing media to students

5.5. Evaluation

At this stage, researchers conducted an evaluation to assess the extent to which the objectives of the learning media development had been achieved as expected. Based on validation results from media and content experts, the "Monopoly Jelajah Pulau Jawa" media, supported by QR codes, was deemed feasible and ready for implementation in the field. These results indicate that the developed learning media is not only visually appealing but also effective in helping students understand cultural diversity material in a more contextual way.

The Monopoly Java Island Exploration learning media, supported by QR codes, in the science subject of cultural diversity, has been declared effective based on the results of a questionnaire of teacher and student responses. This effectiveness can be explained based on learning media theory, which states that learning media combined with games monopoly has the advantage of creating a fun learning atmosphere and can make students active so that they can easily understand the concept of the material. According to Mahardika et al., (2025) that the development of monopoly media aims to increase student focus and motivation through a structured learning flow. In addition to creating a pleasant classroom atmosphere, this media also functions to facilitate understanding of the material and increase the effectiveness of the learning process as a whole.

The elements of the Monopoly game that actively involve students, such as taking turns playing, discussion, collaboration, decision making, and interaction between participants and teachers, according to the theory can involve students and teachers playing an active role which makes students more active during the learning process, not passive during learning, and become a fun learning medium as a learning support so that students can understand the material that will be taught by the teacher, and monopoly media is preferred by students for learning.

In addition, the use of QR Code in learning media with games can make it easier, more practical, and in accordance with the current technological era in delivering material in the current era that makes learning easier, in line with the learning theory that QR code technology is an alternative solution to support 21st Century learning which can be used as a technology-based learning media by enabling students to access learning materials more quickly and practically.

According to game-based learning theory, incorporating game elements into learning can increase motivation because of the challenges, rules, and enjoyment involved in the learning process. The QR code-based Monopoly game actively engages students, boosting their motivation.

Based on the game-based learning theory reflected in the Monopoly game, game elements can increase learning motivation due to the challenges, rules, and enjoyment in the learning

process. This is evident from the responses of students who showed enthusiasm and active involvement during the learning process. Furthermore, the analysis of teacher and student responses showed that the media received a "Very Good" rating from a sample of 20 fourth-grade students at SDN Jatibarang 03, Semarang City. The results of teacher responses indicate that this media is practical to use because it does not require additional complicated tools. Teachers can easily use QR Codes to access videos or other supporting materials without having to change the existing learning structure.

Thus, the evaluation results confirm that the QR code-assisted Monopoly on Java Island Exploration media is not only theoretically feasible but also relevant for practical application in fourth-grade elementary schools. This success also strengthens the implementation of the Independent Curriculum, which emphasizes the importance of active, collaborative, and experiential learning.

6. Conclusion

Based on the development and trial results, the QR Code-assisted Monopoly Explore Java Island media was declared highly feasible to use, as indicated by validation from material experts (96% and 90%), media experts (96% and 88%), and teacher responses (100%) and students (99.5%). These findings confirm the theoretical contribution of research in the study of game-based learning media that the Monopoly game can be developed into a contextual learning medium that is very well received by users and has the potential to support effective learning. The integration of QR Codes shows that simple technology can connect physical media with digital content in science learning, thereby encouraging active and meaningful learning. In the context of the Independent Curriculum, this media is relevant to student-centered and collaborative learning and has practical implications for teachers, schools, and further research.

Limitation

The development of the Java Island Monopoly media is not free from limitations, including because the large product is quite difficult to store, the product developed is limited to one material in the form of cultural diversity material for grade IV of the Social Sciences subject, educated in large numbers, requires a lot of time in designing to suit the needs of students, the presentation of the scan icon on the Trimble Connect web experiences several obstacles to the limited time for long-term use, so that scanning images that display 3-dimensional city icons cannot be used in the long term. However, the use of the Java Island Exploration Monopoly media is expected to be an interesting, innovative, educational and efficient learning media for both teachers and students. This media can also increase learning interest for students in understanding and experiencing the experience of the media only on the diversity of the Java Island in a more interactive and enjoyable way. The development of the monopoly game into a learning medium is expected to enable students to understand the material being taught by the teacher through a fun game, thereby providing a new atmosphere in the classroom. It is hoped that it will foster a sense of togetherness and cohesiveness within a team, and with the existence of learning media, it will be easier for teachers to organize and condition the class for effective and conducive learning purposes.

Recommendation

Based on the research findings, there are several recommendations for future media development research. First, it is recommended that schools and educational institutions organize and support training for teachers and prospective teachers in the development and use of innovative and educational media, based on simple technologies such as QR Code, AR (Augmented Reality). This is important in supporting an interesting learning process and increasing the interest and activeness of students in class. Second, Teachers can utilize the QR Code-based Java Island monopoly media as a supporting tool or aid in the teaching and learning process, especially in the subject of science and cultural diversity, in order to create a

more interactive learning atmosphere and encourage active student involvement. Third, further research is recommended to conduct broader and more diverse research, and consider the characteristics of students. In addition, media development is directed at the integration of other technologies, especially those that influence 21st-century skills and are relevant to the curriculum used.

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Conflict of Interest Statement

The author declares that there is no conflict of interest related to the research, writing, or publication of this article.

Declaration of Generative AI and AI-assisted Technologies

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