Development of Domino Card Media Based on QR Code to Improve Numeracy Skills of Grade 3 Students of UPT SDN Tumpang 02 Blitar Regency

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A B S T R A C T

This study aims to determine the validity, feasibility, and attractiveness of the development of domino card media based on QR codes for fractional material and to determine whether there is an increase in the numeracy skills of grade 3 students of UPT SDN Tumpang 02 Blitar Regency using the development of domino card media based on QR codes for fractional material. The method used in this study is the Research and Development (R&D) research method or research and development using the Borg and Gall research model consisting of 10 steps. This study uses data collection techniques in the form of questionnaires and tests. Based on the results of the study, it can be seen that the validity of the domino card media based on QR codes for fractional material obtained a total percentage of 94.84% and is included in the very valid category. The feasibility of the domino card media based on QR codes for fractional material obtained a final value of 84.375% and is included in the very feasible category with revisions. While the attractiveness of the domino card media based on QR codes for fractional material obtained a final value of 99.38% with a very interesting category. In addition, the results obtained from the n-gain value obtained a value of 0.87 with a high category, which means that there is a high influence in improving students' numeracy skills using the development of domino card media based on QR codes for fractional material.

1. Introduction

Numeracy skillsis the ability, self-confidence, and desire to use quantitative information in making decisions in various aspects of life.(Ekowati & Suwandayani, 2019). Winata et al., (2021)defining numeracy ability is the ability that someone has in using the mathematical ability that they have in explaining an

event. This ability to count or numeracy is important to be taught from an early age(Yanti et al., 2023). Teachers have a responsibility to stimulate students to be able to implement and improve their numeracy skills properly and correctly.

Learning media is a tool that conveys teaching messages, as a supporting medium for teaching and learning activities, so that the delivery of material is conveyed to children well.(Fatih, 2023). Learning media is an important component as a driving force in teaching and learning activities that can stimulate children's reasoning.(Mufidah et al., 2023). By writing, someone can express a certain goal or intention to other people clearly so that readers can understand the meaning (Inayah,2024).

Adequate facilities are needed to create an effective learning process.(Nina et al., 2023). Learning media is media that conveys messages or information that contains the intent or purpose of learning.(Hasan et al., 2021). Through fun learning media, it is hoped that it will be able to raise students' self-confidence to a higher level.(Alfi & Wibangga, 2023).

The lack of students' ability in calculating or what is called numeracy skills is known through the results of observations conducted by researchers at UPT SDN Tumpang 02 Blitar Regency. Researchers found that 12 out of 19 students were still lacking in numeracy skills. Many teachers complained about students' abilities who were still unable to calculate. This is due to the lack of interesting media in the learning process. Teachers also rarely use media because the media is inadequate. In fact, this can cause problems for a person's future because it can cause confusion in doing something related to counting, because basically in everyday life it will not be separated from something related to counting.

Language is an important tool to express and communicate with the others (Sari, 2023). The problems experienced by students include difficulty in calculating numbers. Students also often experience concentration failure or boredom because in the learning process the teacher does not use media to support the success and also the enthusiasm of students to carry out the learning process. The impact of the problems experienced by students includes decreasing student enthusiasm in carrying out a learning activity. In addition, students also feel that they still do not understand or are not able to work on questions or problems that will later be given to students to find out the increase in student understanding when carrying out learning.

Seeing this situation, the world of education has created many innovations in learning media. Learning media has many types that are developed through various sources, one of which is Domino cards. Domino card media is a media in the form of a game consisting of 13 cards. Domino cards have 2 sides, namely the question side and the answer side. On the question side, there is a QR Code that contains the question. This card has properties that are easy for students to remember and understand.

The use of Domino card media will be more effective and successful if used in conjunction with the lecture method. This is intended for students who have poor memory because the material that must be received is a lot. In improving students' Numeracy skills, media that is easy for students to understand and interesting is needed. The advantages of domino card teaching aids include: most students already know how to play domino cards so it is not difficult to apply in learning and can improve students' arithmetic skills, because the more they practice counting, the more proficient students will be.(Nurfitriyanti & Lestari, 2016). In addition, this media also has an attractive design accompanied by the presentation of material in the form of a QR code. The small size of the domino card also makes it easy to carry this media anywhere.

According to researchers, media plays a very important role in a learning process. Without media, students will have less understanding of the material that has been delivered, therefore the importance of Domino card media in improving students' counting skills is very necessary for the future of students and the needs of students' social environment. QR Code is an image in the form of a 2-dimensional matrix as a data storage in it(Nadalina et al., 2023). This QR code contains a question about fraction material complete with steps to complete it.

The researcher took this research based on previous research entitled "Development of Domino Card Media to improve understanding of science learning concepts on the material of human and animal respiratory organ functions in class VA students of MIN 2 Malang" by Sabari(2023)which obtained the results that the Domino media developed was effective to use. This can be proven because the percentage of students who succeeded was greater. In addition, Wulandari et al.,(2022)in his journal entitled "Development of Domino Card Media to Improve the Cognitive Abilities of Early Childhood" also shows that the results of learning using Domino card media show that 90.7% of children experienced an increase in cognitive development with development in accordance with the expected criteria and developed very well.

Based on the review above, the innovation that the researcher offers to find a way out of the problems that exist in UPT SDN Tumpang 02 is to conduct a development research entitled "Development of Domino card media based on QR Code for Fraction material to improve the Numeracy skills of class 03 students of UPT SDN Tumpang 02, Blitar Regency". The purpose of this research includes determining the validity, feasibility, and attractiveness of the development of Domino card media based on QR Code for Fraction material and determining whether the numeracy skills of class 3 students of UPT SDN Tumpang 02, Blitar Regency have increased by using the development of Domino card media based on QR Code for Fraction material.

2.   Methodology

The research and development method or Research and Development (RnD) was chosen as the research method. Sugiyono defines RnD as a research method used

to produce certain products and test these products.(Sugiyono, 2016). The Borg and Gall research model is used as a stage in this research. This model consists of 10 stages that begin with identifying potential and problems and end with the mass production stage.(Sugiyono, 2022).

The subjects of this study were 19 students of grade 3 of SDN Tumpang 02, Blitar Regency as the respondents of media attractiveness and as the research targets, lecturers as expert validators, and teachers as respondents of feasibility. This study used data collection techniques in the form of questionnaires and tests. This questionnaire was aimed at expert validators, teachers, and students. While the test was aimed at students to determine their numeracy skills. The data validity test used validity and reliability tests.

The data obtained from the study are 3, namely media validation data, teacher and student response data, and student numeracy skill test data. The values obtained will be interpreted with the results. The media validation data, teacher responses, and student responses are analyzed using the formula as in Table 1.

Table 1. Interpretation of Validation Questionnaire Values and User Responses

No.	Achievement Level	Qualification
1.	76% - 100%	Eligible (no revision needed)
2.	56% - 75%	Good enough (no revision needed)
3.	40% - 55%	Not suitable (needs revision)
4.	0 – 39%	Not suitable (needs revision)

Source:(Muna & Wardhana, 2022)

Meanwhile, the analysis of the numeracy skill test results data uses the N-gain formula as follows.

$$\text{N-Gain} = \frac{Spost - Spre}{Smaks - Spre}$$

Information:
Spontaneously   = Posttest score
Spread   = Pretest score
Smaks   = Maximum Score

The N-Gain results are then interpreted using the criteria in Table 2.

Table 2. N-gain Criteria

The magnitude of N-Gain	Interpretation
$g \geq 0.7$	Tall
$0.7 > g \geq 0.3$	Currently
$g \geq 0.3$	Low

Source :(Rosida et al., 2018)

3.   Results and Discussion

The following are the results and discussion of the research that has been developed.

Results

 A. Media Creation Stage

Based on product design, it is divided into 2 stages, namely:

  a. Material Selection

   In the development of Domino card media products based on QR Code, the material is selected from relevant literature and web sources. This selection is of course also based on the consideration of lecturers, experts and class teachers. The selected material also adjusts to the KD and the learning objectives themselves.

  b. Initial Design Planning

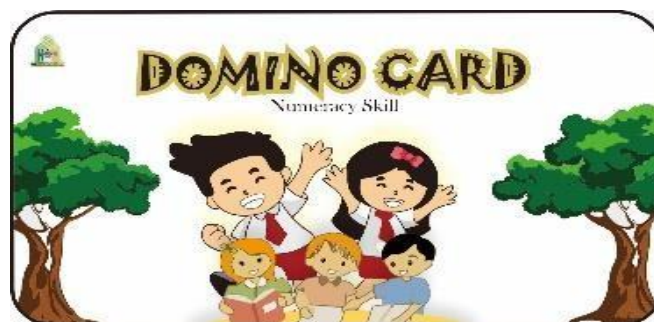   The initial design planning stage can be seen in Figure 1.

Figure 1. Initial Design Planning

This stage contains several steps, including:

   a) The initial analysis carried out by the researcher was to determine what students needed based on the results of initial research observations.
   b) The selection of material, namely fractions, is in accordance with the potential problems of grade 3 students at UPT SDN Tumpang 02.
   c) The composition of Domino Card Media is, Cover, Instructions for Use, Basic Competencies, Main Material, Evaluation Questions, Cover or Closing.

  c. After going through the stages above, the resulting product is a Domino card media based on QR Code Fraction material which aims to add learning media that aims to help teachers in the learning process of grade 3 students of UPT SDN Tumpang 02 Blitar Regency.

   B. Expert Validation

The data obtained from the validation of media experts and material experts, and the assessment of practitioners and users is an assessment of the product

developed, namely the Domino card media Based on QR Code fraction material. This assessment is used as a guideline to determine whether the product developed is suitable for use or not. The suggestions given by experts and teachers are also used as guidelines for revisions until the developed product is suitable for testing. The following is a description of the data obtained in this study.

      a.   Validation Questionnaire Data Against Media Validity

Expert validation is carried out to determine whether the product being developed is suitable for use or not. There are 2 stages of validation used in this product, including:

      a)   Subject Matter Expert

Validation of the material on the Domino card product based on the QR Code was carried out by Mr. Fathul Ni'am, M.Pd on May 28, 2024. The data from the validation results of the material expert obtained values including, a) content/material 100%, b) feasibility of Domino card content/material 87.5%, and c) QR code content (video) 100% with an average reaching 97.5% which indicates very valid criteria. The results of the material expert validation test in the form of a graph can be seen in Figure 2.
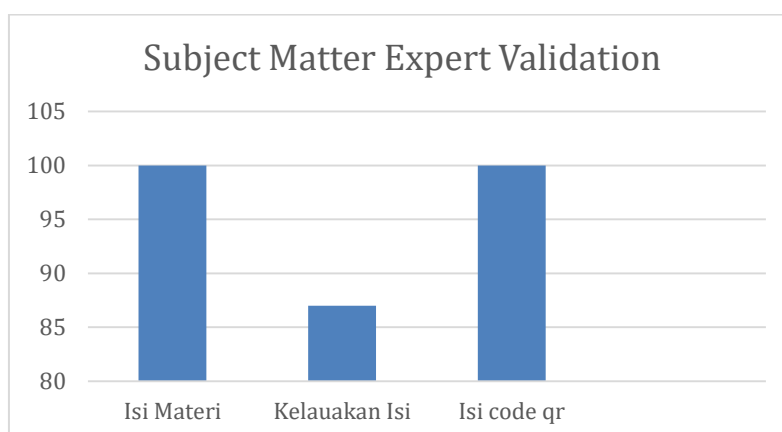

Figure 2. Graph of Validation Test of Material Experts on Students' Numeracy Skills

      b) Media Expert

Validation of the Domino card media based on QR Code was carried out by Mr. Fernadiksa Rasta, M.Pd on May 28, 2024. The results of the media expert validation obtained the following results: a) Media size 91.67%, b) Material Aspect 100%, c) Content Design 90%, d) Use of QR Code 100%, and e) QR Code Design 100%, with very valid criteria. The results of the media expert validation test are presented in the graph in Figure 3.
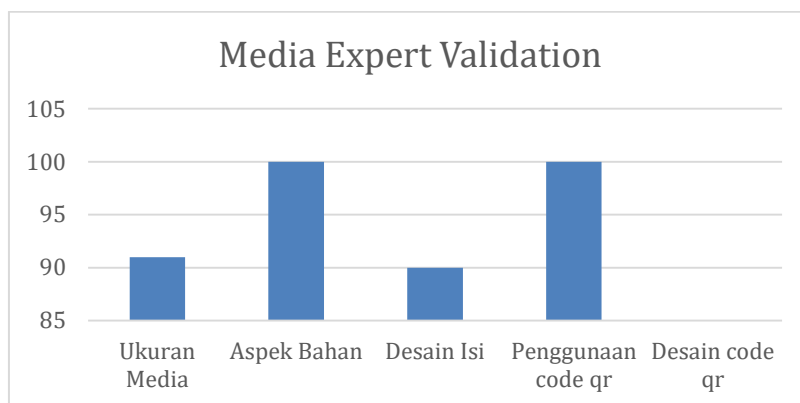
Figure 3. Media Expert Validation Test Graph for Students' Numeracy Skills

b. Questionnaire Data on Student Eligibility

Validation of Media Feasibility on the QR Code-based Domino card product was carried out by Mrs. Badi, S.Pd as a Teacher at UPT SDN Tumpang 02 on May 31, 2024. The results of the media feasibility assessment carried out by the researcher obtained values including, a) appearance 75%, b) presentation of Domino card material 83.33%, and c) benefits 87.5% with a total of 84.375% which shows very feasible criteria according to the revision. The results of this media feasibility validation test are presented in the graph in Figure 4.
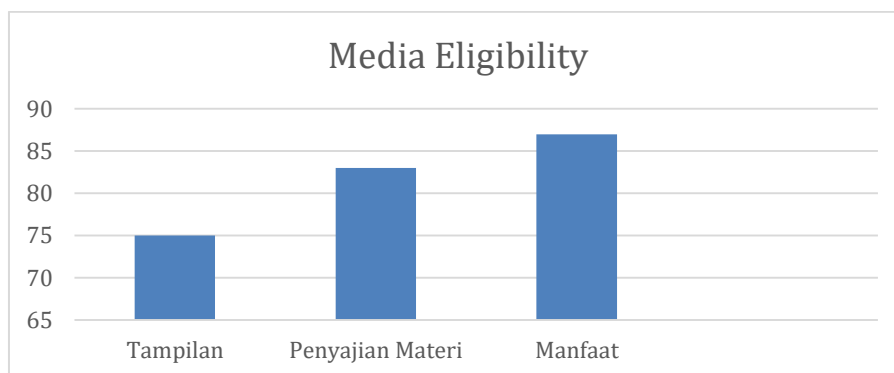

Figure 4. Graph of Media Suitability Test on Students' Numeracy Skills

c. Student Interest Questionnaire Data

The Media Interest Test was conducted by 19 students in grade 3 on May 31, 2024. The results of the media interest test obtained values including, a) understanding of the media 98.15%, b) enjoyment of the media 100%, c) tendency towards the media 100%, which obtained an overall percentage of 99.38% with very interesting criteria. The results of the media interest test are presented in the graph in Figure 5.
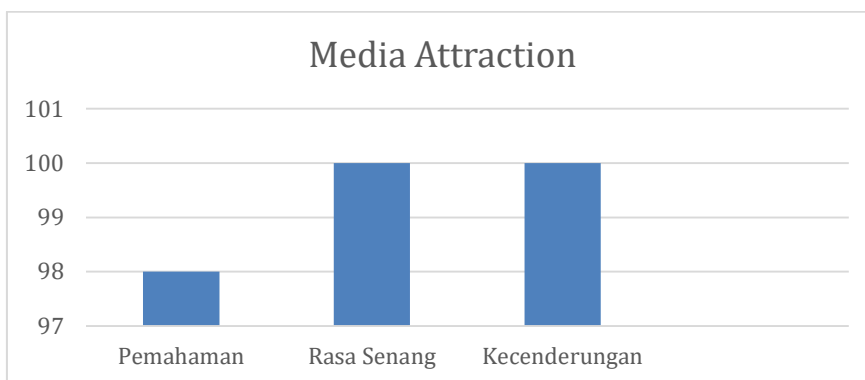
Figure 5. Test Graph of Media Interest Towards Students' Numeracy Skills

C. Design Revision

After the media validation stage is carried out, the next stage is the implementation of media revision. The results of the Domino card media revision will later make Domino cards more feasible to be tested on students. The following is a presentation of the revisions that can be seen in table 3.

Table 3. Product Revisions

No.	Before Revision	After Revision
1.	The use of letters is clarified	The font has been explained
2.	Before there was a start card	Background has been changed
3.	The numbers are unclear	The numbers are clear

D. Product Trial

This product trial stage was carried out 2 times, namely the small-scale product trial stage and the large-scale product trial stage. The explanation is as follows

a. Small Scale Product Trial

The implementation of a small-scale product trial of the U Domino card media based on QR codes was carried out on May 29, 2024 in class 3 with a total of 10 students as subjects. This trial was conducted in class IV. This trial was accompanied by a trial of the numeracy ability test instrument which will be used to see whether the test is valid and reliable or not. The test which is declared valid and reliable can then be applied. The following are the results of the validity of the numeracy skill test which can be seen in table 4.

Table 4. SPSS Test of The Validity of Students' Numeracy Skill Test

Question Number	rcount	rtable	Results
1	0.889	0.632	Valid
2	0.640	0.632	Valid
3	0.643	0.632	Valid
4	0.836	0.632	Valid
5	0.889	0.632	Valid
6	0.640	0.632	Valid
7	0.836	0.632	Valid
8	0.889	0.632	Valid
9	0.889	0.632	Valid
10	0.836	0.632	Valid

The results above show that the validity of the test has obtained valid criteria as a whole and is ready to be applied. Meanwhile, the results of the reliability of the numeracy skill test can be seen in table 5 as follows.

Table 5. Reliability Test of Students' Numeracy Skill Test

Reliability Statistics	
Cronbach's Alpha	N of Items
,937	10

The results above show that the test reliability is in the reliability category of $0.90 < r11 \leq 1.00$ with very high reliability criteria.

b. Large Scale Product Trials

After the product has been tested on a small scale and the test is declared valid and reliable, the next stage is large. This large-scale product trial was conducted on 19 students in grade 3. Students were given treatment starting with a pretest to test students' numeracy skills before being given treatment. After that, the researcher carried out learning using QR code-based domino card media. If the learning has been completed, students are then given a posttest to test students' numeracy skills after being given treatment. This is done to see if there is an there is an effect on increasing students' numeracy skills using QR code-based

domino card media. The following are the results of the pretest and posttest of the students' numeracy skills test, which can be seen in table 6 below.

Table 6. Results of Students' Pretest and Posttest Scores on Numeracy Skills

Respondent Code	Pretest Score	Posttest Value	Maximum Value
1	9	9	10
2	9	10	10
3	8	10	10
4	7	10	10
5	7	10	10
6	8	10	10
7	8	10	10
8	8	10	10
9	8	10	10
10	9	9	10
11	9	10	10
12	8	10	10
13	7	9	10
14	9	10	10
15	6	10	10
16	8	10	10
17	9	10	10
18	7	8	10
19	8	10	10
Total value	152	185	190

Based on the table above, the N-gain value is known as follows.

$$\text{N Gain} = \frac{Spost - Spre}{Smaks - Spre} = \frac{185 - 152}{190 - 152} = \frac{33}{38} = 0.87$$

Based on these results, the value obtained was 0.87 with the criteria of "high" which means that the increase in students' numeracy skills was highly influenced by the media developed.

Discussion

A. Validity of Domino Card Media based on QR Code

Validation is an important step that must be taken by researchers. This validation is intended to determine the assessment of the media that has been developed and will later be used as a guideline for revision if deficiencies are found.(Palupi, 2017). Media validation was conducted by meeting directly with the lecturer as a media expert. The final value obtained from the media validation results was 92.1875% with very valid criteria. This is in line with Putri's research,(2021)which states that the development of domino card media on mathematics material gets a valid category from media experts so it is worthy of being tested. The suggestion from media experts is to improve the domino card media based on QR code. The overall conclusion obtained from media experts is that the domino card media based on QR code on fraction material is worthy of being tested according to the suggestion.

After the media validation was carried out, the next step was material validation. Material validation was carried out by meeting directly with the lecturer as a material expert. The final value obtained from the results of the material validation was 97.5% with very valid criteria. This is in line with Putri's research (2021) stated that the development of domino card media on mathematics material received a valid category from material experts so that it was worthy of being tested. The suggestions given by material experts included improving the font used. In addition, it was also suggested to adjust the colors used. The overall conclusion obtained from material experts was that the domino card media based on QR codes for fractional material was worthy of being tested according to the suggestions. Based on this review, it can be concluded that the validity of the domino card media based on QR codes for fractional material received a total value of 94.84% so that the domino card media based on QR codes for fractional material had very valid validity. The statement above is reinforced by research by Fatih (2023) states that the results show that the media developed has good value and is included in the "very valid" criteria.

B. Eligibility of QR Code Based Domino Card Media

A feasibility test is carried out to determine the suitability of the learning media and determine the weaknesses of the media by providing a product assessment based on the references/aspects/indicators contained in the instrument.(Hapsari & Zulherman, 2021). The feasibility of the media was assessed using a teacher response questionnaire related to the QR code-based domino card media for fractional material. This assessment was carried out by meeting the teacher directly as a practitioner. The final value obtained from the results of the teacher response questionnaire regarding the feasibility of the media was 84.375% with the criteria of very feasible with revision. This is in line with the results of Wiratni's research(2021)which obtained the results that the domino card media received a very high eligibility value. The overall conclusion obtained from the teacher's response is that the QR code-based domino card media for fractional material is worthy of being tested with revisions according to suggestions. The statement above is reinforced by research by Karimah et al.,(2023)stated that the diorama learning media obtained a score of 64, then it was recalculated to determine the percentage of the media feasibility test, which was 88% with the category "Very Feasible".

C. The Attraction of Domino Card Media Based on QR Codes

The level of attractiveness of learning media can influence student learning outcomes.(Febrian & 'Aini, 2022). If students are interested in the learning media used, then students will be more motivated in participating in learning activities so that their learning outcomes also increase. The attractiveness of the media is assessed by a student response questionnaire related to the QR code-based domino card media for fractional material. This assessment is carried out by meeting students directly as media users. The final value obtained from the results of the student response questionnaire regarding the attractiveness of the media is 99.38% with the criteria of very interesting. This is confirmed by

research conducted by Nurhayati(2021)which obtained the results that the domino card media obtained a student response of 99.8%. In addition, other research was also conducted by Karimah(2023)which obtained the results of the field interest test with a percentage of 95.7%. The conclusion obtained overall from the student responses is that the domino card media based on QR codes for fractional material is an interesting media to use as a learning medium in the classroom.

D. Improving Students' Numeracy Skills

Learning media is a means of conveying messages to students in the form of knowledge and information.(Fatih & Alfi, 2021). There are many learning media that already exist. These learning media are developed in such a way as to adjust to student characteristics, teaching needs, and expected conditions. Rapidly developing technology will affect the world of education. Therefore, technology-based learning media will facilitate the learning process in terms of effectiveness and efficiency.(Firmadani, 2020). This research develops domino card media based on QR code. Domino card media is a media that is played by matching one card with another card with the same number value.(Istyasiwi et al., 2021). In this media there is a QR code that leads to the answer to the question on the domino card itself.

The development of domino card media based on QR code is able to improve students' numeracy skills. Numeracy skills are a person's ability/expertise in using numbers to practically solve various everyday problems.(Hartatik & Nafiah, 2020).This statement is known from the n-gain pretest and posttest numeracy skill scores of students both before and after implementing learning using the media. Based on the results of the n-gain value, a value of 0.87 was obtained with a high category, which means that the development of QR code-based domino card media has a high influence on improving students' numeracy skills. In line with this, Sabari in his research results stated that the development of domino card media can improve students' understanding concepts. Where this understanding concept will refer to students' numeracy skills(Sabari, 2023). This is also in line with research conducted by Aela et al.,(2023)and Alfi et al.,(2020)with the result that the development of appropriate media can improve students' numeracy skills. Based on the explanation above, it can be concluded that the development of QR code-based domino card media can improve students' numeracy skills.

4. Conclusion

The conclusions that can be drawn from the results of the study include the validity of the QR code-based domino card media for fractional material is a very valid media to be used in classroom learning activities. In addition to being valid, this media is also a media that is suitable for use in research activities. Students are also very interested in the QR Code-based domino card media developed by the researcher. This can be seen from the results of the questionnaire filled out by students and also the enthusiasm in participating in learning activities in the classroom. The suggestions that the researcher provides include for teachers, the

QR code-based domino card media for fractional material is expected to be implemented in teaching and learning activities so as to create a variety of fun learning activities. For schools, the development of QR code-based domino card media for fractional material is expected to be a solution to the limited media available. Meanwhile, for further researchers, they can carry out the development of QR code-based domino card media on other materials.

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