DEVELOPMENT OF THE MEDIA GAME MATH CITY BASED ON CHARACTER EDUCATION TO IMPROVE CRITICAL THINKING ABILITY

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ABSTRACT

The low critical thinking ability of students is caused by a lack of skills in understanding and identifying problems, applying appropriate problem-solving strategies, and drawing conclusions from the solutions. The aim of this research is to develop a character education-based learning media game, Math City, to enhance valid, practical, and effective critical thinking skills, showing improvement. The research methodology employed the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) development method. Data collection techniques included observation, questionnaires, and critical thinking ability tests. Sampling was conducted using simple random sampling. The development of the Math City game media received validation scores from media and subject matter experts of 3.80, falling within the valid category, and student and teacher responses averaged 3.26, indicating it is practical. The experimental group's average N-Gain score was 0.45, which is moderate, while the control group's average was 0.17, considered low. The implementation of the Math City game media achieved critical thinking mastery, with classical completeness proving scores above the target score of 71, specifically 81.82, with 85% classically at 94.117%, with 32 out of 34 students achieving mastery. There was a 20.4% influence from learning motivation, and a difference in average critical thinking ability scores between the experimental class at 81.82 and the control class at 70.26. The recommendation from this research is for teachers to optimally use the Math City game media in teaching to engage students effectively.

Keywords: Critical thinking, learning media, characters, educational games.

INTRODUCTION

Education in the age of knowledge (knowladge ege) brings the nation into the competitive digital era (Firdaus & Robandi, 2023) . The minimum competency level in Indonesia has not been achieved, the results shown by *the Organization for Economic Co-operation and Development* (OECD) are that around 71% of students have not achieved competency. 43% of the group of students with low competency were at level 1a, 37% were at level 1b, 16% were at level 1c and 4% of students did not reach level 1c. The highest PISA average was obtained in 2006 at 391 points, while the lowest PISA average was in 2003 at 360 points and in PISA 2018 Indonesia received an average of 379 points. According to data (OECD, 2019) the proportion of Indonesian children aged 15 years with competencies below the minimum level reached 96% in science, 90% in mathematics, and 88% in

reading. In PISA 2018 the proportion fell to 66% in science, 76% in mathematics and 75% in reading.

21st century education in the era of the industrial revolution includes critical thinking, creative thinking and problem solving competencies (Mardiyanti, 2020) . The goal of education in the 4.0 era is to prepare creative digital-based human resources (Efendi, 2019) . Educational progress is supported by learning systems and methods that have implemented digital technology (Rahayu, 2021) . The focus of education in the 4.0 era is on developing 4c skills in preparing for *society* 5.0. *The National Education Association* (NEA) has identified 21st century skills as " *The Critical thinking, Communication, Collaboration, Creativity* (4Cs) skills which include critical thinking, creativity, communication and collaboration skills (Sulistyaningrum et al., 2019) .

Critical thinking ability is the ability to generalize, prove, or evaluate unknown mathematical situations recursively by combining previous knowledge, 4 mathematical reasoning, and cognitive strategies (Lubis et al., 2021) . According to (Facione, 2020) critical thinking skills have 6 aspects, namely interpretation *, analysis* , *evaluation* , inference *,* explanation *and* self- *regulation* . Critical thinking skills are important for students to have in dealing with complex problems (Gunawan et al., 2022) . Character education in the 21st century needs to be maintained. Teachers at schools have a central role in shaping the character of students at school so that they can become good successors to the nation (Santika, 2020) . Students with good character tend to develop critical thinking skills more quickly than students with less good character. According to data (Kemdikbud, 2019) strengthening character education can be focused on religious values, national values, togetherness values, independence values, and integration values

The results of observations at SMA Negeri 1 Mesuji Raya in Ogan Komering Ilir Regency showed that students' mathematics learning results tended to be less good. This is shown from the results of classroom learning activities which found problems with some indicators of students' low critical thinking abilities. When working on mathematics problems, the material is sequences and series during learning. Some students' mistakes can be seen from their lack of ability to identify problems. The stages of problem solving that students work on are also not yet systematic. Students have not been able to determine relevant and specific ideas in a problem and after writing the answer, some students also do not provide conclusions from the answers obtained and do not try to find other solutions that can be taken in solving the problem. Several problems in the field are clearly visible, namely that teachers' teaching methods still use conventional methods, this causes students not to have a high interest in learning so that students' critical thinking abilities are also very low. Improper implementation of learning will have a negative impact on the character of students. This is found when learning, there are still many students who do not pay attention to learning activities properly because they feel bored and it is not in accordance with their learning characteristics at school.

Based on the problems found, the solution to overcome is to attract students' interest in learning so that they can be well motivated during learning. The development of learning media provides direct support for improving the critical thinking skills of students with good character. The ability to think critically is not directly possessed by students but requires tools (Isyarotullatifah, 2019; Mawarsari et al., 2024). Each student's critical thinking ability, which is also different, requires tools and encouragement in the form of forming learning motivation. Motivation to learn is one of the factors that influences critical thinking skills and determines student success in the learning process (Mawarsari et al., 2024). Researchers developed the Math City game learning media based on character education on rows and series material to improve the critical thinking skills of class X students.

METHOD

The research method uses *Research and Development* (RnD) with this research model using the *Analysis* , *Design, Development, Implementation and Evaluation* (ADDIE) approach (Sugiyono, 2019) . This research was conducted at SMA Negeri 1 Mesuji Raya with a population of 102 class control class students and 34 experimental class students using a *simple random sampling technique.* Data collection techniques are carried out using observation, questionnaires, tests and documentation. The development research questionnaire uses a media expert validation questionnaire, material expert validation to produce validity data. Student response questionnaires and teacher responses are used to produce practicality data. The results of the validity and practicality questionnaire assessment are qualitative data in the form of input and suggestions as well as quantitative data in the form of media assessment results which will be analyzed descriptively. Scoring uses an interval scale (4) very good, (3) good, (2) poor, (1) very poor. Calculation of the average validation questionnaire score for media experts and material experts using:

$$X = \frac{\sum x}{n}$$

Information:
X = Average score
$\sum x$ = Total Score
n = Number of items

Table 1:
Media Assessment Criteria

Interval Value	Criteria
3.6 ≤ x ≤ 4.0	Very good
2.6 ≤ x ≤ 3.5	Good
1.6 ≤ x ≤ 2.5	Not good
1 ≤ x ≤ 1.5	Very less

The media effectiveness test was carried out using Excel and SPSS programs with a significance level of 5%. The tests carried out used individual completeness and calcical completeness tests, influence tests using significance tests, linearity tests, average difference tests and tests for increasing critical thinking skills using the *N-Gain test* . The hypothesis in this research is to develop Math City game learning media that is valid, practical, effective and can improve critical thinking skills.

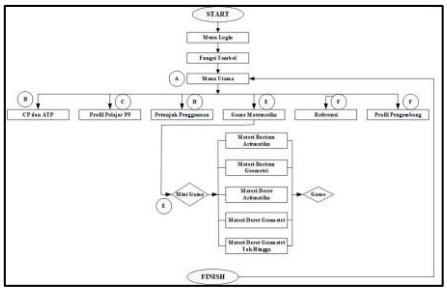
FINDINGS AND DISCUSSION

The development of the Math City game media based on character education is a type of Research and Development (RnD) research with the ADDIE development model which consists of 5 stages. Analysis stage , design stage , development stage , implementation stage *and* evaluation *stage* . The first stage of analysis (*analysis*) of learning media development is the initial problem analysis stage of learning needs through the observation and interview stage with students and teachers at SMA Negeri 1 Mesuji Raya which shows the results that the use of learning media in learning activities is not optimal, causing students' interest in learning. mathematics is relatively lacking. This lack of interest in learning makes mathematics material increasingly difficult to learn (Prawidia & Khusna, 2021) . Through competency analysis, sequence and series material requires understanding and solving using critical thinking skills. Mathematics learning, apart from instilling an understanding of formulas, must also instill an understanding of concepts that

are inherent in everyday life so that it is easy for students to understand and interpret each lesson (Rahmasantika & Prahmana, 2022) . The results of the learning environment analysis show that teaching and learning activities have adapted to the use of technology, of course this allows both students and teachers to be proficient in operating gadgets even though their use has not kept pace with developments in learning with technology.

The second stage of design *consists* of collecting data, making a flowchart *and* making a sketch (*storyboard*) . The stage of collecting data in the form of material, questions and answer keys which will be presented in learning media products. Using reference mathematics books that are suitable for use in schools covering class X sequence and series material and selecting backgrounds, fonts, images, sounds and buttons that will be used in learning media. The stage of creating *a flowchart* for a media or flow chart that makes it easier for researchers to compile the workflow of a media that will be developed.

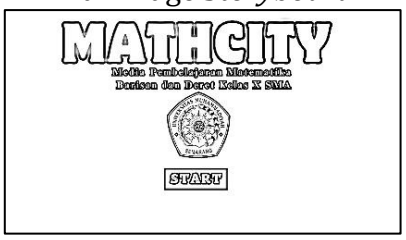
Figure 1:
Flowchart



Stage of making *storyboard sketches* (product design).

a) Main page

Figure 2:
Main Page *Storyboard*

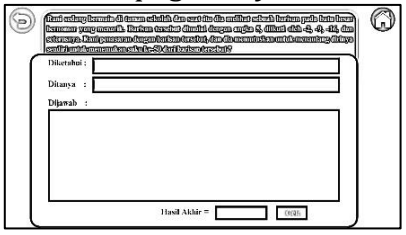


b) P5 Profile Page

Figure 3:
P5 Profile Page *Storyboard*

c) Games Page

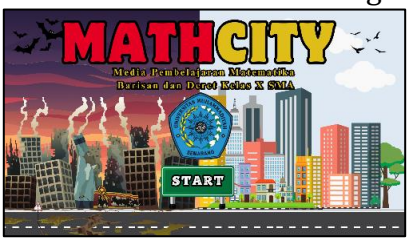
Figure 4:
Game page *storyboard*



The third stage of development *consists* of the stages of creating media products, product validation and product revision. The product manufacturing stage is carried out with the initial step of assembling all the components that have been carried out at the design stage.

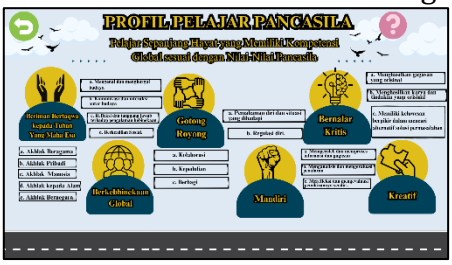
a) Main page

Figure 5:
Realization of the Main Page



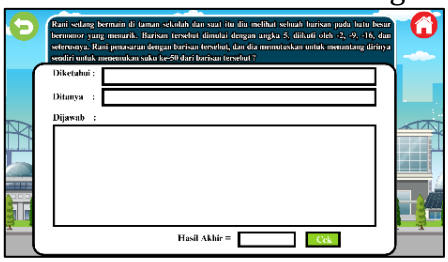
b) P5 Profile Page

Figure 6:
Realization of the P5 Profile Page



c) Games' Page

Figure 7:
Realization of the Game Page



Products that have been developed need to receive proper recognition and feedback on the product. Product validation carried out by media experts and material experts will be used as the basis for the initial revision of the *Math City game media product* so that it can be made better until media results are obtained that can be stated as valid. Media expert validation was carried out by 1 mathematics lecturer who is an expert in their field and 2 ICT expert teachers. The results of the media expert's assessment are as follows:

Table 2:
Media Expert Validation

Aspect	Average value	Information
Presentation	3.93	Very Valid
Appearance	3.52	Very Valid
Convenience	3.78	Very Valid
Final score	**3.64**	**Very Valid**

The results of media expert validation obtained an average value of 3.64 which is in the interval $3.6 \leq x \leq 4.0$ with very valid criteria. These results indicate that the *Math City* game learning media is valid. This is because the presentation and display aspects are in accordance with the development of the independent curriculum by presenting the city environment as a depiction of characterful activities in the everyday environment so that apart from being interesting, this also makes it easier for students to immediately understand the meaning and purpose of using the media. The ease of using the game and the complete set of buttons in *Math City media* really attract students to learn new things in learning activities (Hidayati & Rezania, 2023) . Material expert validation was carried out by 3 mathematics teachers who are experienced in their fields. The results of the material validation assessment are as follows:

Table 3:
Material Expert Validation

Aspect	Average value	Information
Curriculum	4.00	Very Valid
Presentation	3.89	Very Valid
Language	4.00	Very Valid
Content Quality	3.95	Very Valid
Final score	**3.96**	**Very Valid**

The average results of aspects assessed by material experts obtained an average of 3.96 which is in the interval $3.6 \leq x \leq 4.0$ with a very valid category. These results indicate that the material contained in the *Math City game learning media* is valid and can be used as learning media in learning activities (Maryana et al., 2019) . This is because the aspect of presenting material on sequences and series presented in the *Math City game media* displays all sub-materials starting from arithmetic series, geometric series, arithmetic series, geometric series and infinite geometric series. *The Math City* media game is also equipped with learning outcomes and explanations of Pancasila student profiles that are in accordance with aspects of the independent curriculum so that learning information is more easily accessible. The *Math City* game media fosters students' interest in learning because the quality of the game content is not monotonous (Utami & Leonard, 2023) . Math City game media provides various quiz games as a warm-up before playing games that require critical thinking skills. Recapitulation of the results of the assessment by media experts and material experts obtained an average value of 3.80 with very valid criteria in the interval $3.6 \leq x \leq 4.0$.

The fourth stage of implementation (*Implementation*) was carried out in a limited trial with 10 students to test the suitability of the media before being tested in the field. The results of the limited trial in the form of suggestions and input for the *Math City game learning media* were good. This is because the *Math City game media* presents a game atmosphere that suits everyday life, of course this is easier for students to accept in learning and is easy to increase students' learning motivation. Game media that have been declared good are then subjected to field tests which are carried out in 3 meetings. The effectiveness of the Math City game learning media is measured by conducting *a pre-test* and *post-test* for the control class and experimental class in the following table:

Table 4:
Pretest and Posttest N-Gain Test

Class	Mark		N-Gain	x
	Max	Min		
Pretest Experiment	80	70	15.43	0.453

Experiment Posttest	91	80		
Control Pretest	81	86	5.94	0.174
Control Pretest	86	75		

Gain test calculation table, there is a difference in *pre-test* scores and *post-test scores* with the total N- *Gain* of the experimental class being 15.43 and an average score of 0.453824. The total N- *Gain* of the control class is 5.94 with an average score of 0.1747. The results of this calculation show that the control class is in the *N-Gain interval* < 0.30 with low criteria. Meanwhile, the experimental class is in the interval 0.30 < *N-Gain* ≤ 0.70, medium criteria, which means that there is an increase in students' critical thinking abilities after being given the use of the *Math City game learning media.* The calculation results showed that there were 29 experimental class students with medium criteria with a percentage of 85.29% and 5 students with low criteria with a percentage of 4.71%. The control class contained 6 students with medium criteria with a percentage of 17.65% and 28 students with low criteria with a percentage of 82.35% . Overall, the N-Gain value in the experimental class is higher than the control class

Individual completion tests are carried out to find out whether students have achieved completeness or not. The criteria for completeness in critical thinking skills is 71.

Table 5:
One Sample T-Test Individual Completion Test

	N	Mean	Std. Deviation	Std. Error Mean
Evaluation Test Results	34	81.82	7,424	1,273

t test is as follows:

$$t = \frac{\bar{X} - \mu 0}{\frac{S}{\sqrt{n}}}$$

$$t = \frac{81{,}82 - 71}{\frac{8{,}39}{\sqrt{34}}}$$

$$t = \frac{10{,}82}{1{,}43}$$

$$t = 7.56$$

The t *table value = 2.034 because the dk value = 33 and the calculated* t value = 7.56, meaning 7.56 > 2.034, means H_0 is accepted and H_1 is rejected. So it can be concluded that the critical thinking skills of the experimental class using the *Math City game learning media* based on character education achieved a KKTP with an average score of 81.82 with 32 students in the complete category and 2 incomplete students with a KKTP of 71.

Classical completeness test with criteria if $z_{hitung} > z_{tabel}$ with α = 5% then H_0 is accepted as the proportion of students achieving KKTP is more or equal to 85%. Z *count calculation* :

$$Z = \frac{\frac{X}{n} - \pi 0}{\sqrt{\frac{X0 - (1 - x0)}{n}}}$$

$$z = \frac{\frac{32}{34} - 85\%}{\sqrt{\frac{85\%(1-85\%)}{34}}}$$

$$z = \frac{0{,}94 - 0{,}85}{\sqrt{0{,}003}}$$

$$z = \frac{0{,}09}{0{,}054}$$

z = 1.66

Classical $\frac{32}{34}$percentage $z_{0,5-0,05} = z_{hitung}$.

Test the influence of learning motivation on critical thinking abilities. The influence test is carried out to determine whether there is an influence between the dependent variable and the independent variable. Critical thinking ability in this research is the dependent variable while learning motivation is the independent variable

1) Significance Test

H_0 : b = 0 (Learning motivation has no effect on students' critical thinking abilities)
H_1 : b ≠ 0 (Learning motivation influences students' critical thinking abilities)
The criteria for regression analysis is that the Sig value is <5%, so H_1 is accepted and H_0 is rejected, meaning that there is an influence of learning motivation on students' critical thinking abilities.

Based on the calculation analysis that has been carried out, the results show a significance of 0.007, a significance value of 0.007 < 0.05, so H_1 is accepted that there is an influence of learning motivation on critical thinking abilities. Learning motivation has an influence of 0.844 on critical thinking abilities. The regression equation obtained is Y= a + b X_1 = Y= -42.306 + 0.844 X_1

2) Linearity Test

H_0 : Y = 0 (Non-linear regression equation)
H_1 : Y ≠ 0 (Linear regression equation)
The criterion is if the sig value is <5% then H_1 is accepted.

Table 6:
ANOVA [a] Learning Motivation on Critical Thinking Ability

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	370,230	1	370,230	8,178	.007 [b]
	Residual	1448.711	32	45,272		
	Total	1818.941	33			
a. Dependent Variable: Critical Thinking Ability Evaluation Test						
b. Predictors: (Constant), Learning Motivation						

Based on ANOVA calculations, a significance value of 0.007 <0.05 is obtained, so H_1 is accepted as a linear regression equation.

3) The Great Influence of Learning Motivation

An analysis of the influence of learning motivation on critical thinking skills can be seen in the linear regression table.

Table 7:
Model *Summary*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.451 [a]	,204	,179	6,728
a. Predictors: (Constant), Learning Motivation				

Based on calculation analysis, data showed that the influence of learning motivation on students' critical thinking skills was 20.4%.

The average difference test between the two control classes and the experimental class was carried out to determine the difference in scores for the critical thinking abilities of students who were given learning treatment by providing the *Math City game media* based on character education and classes that were not given the treatment . The results of data analysis show that the sig (2 *tailed*) value is 0.000 < 0.05, meaning that H_1 is accepted so that there is a difference between the experimental class which uses learning media and the control class which does not use learning media from school.

The average comparison test was carried out to determine the comparison of the critical thinking abilities of students in the experimental class who used the character education-based *Math City game learning media* compared to the control class who did not use the *Math City game media .*

Table 8. *Group Statistics Mean*

	Class	N	Mean	Std. Deviation	Std. Error Mean
Evaluation Test Results	Experimental Class	34	81.82	7,424	1,273
	Control Class	34	70.26	7,350	1,260

Based on the calculation analysis, the results obtained in *group statistics,* the average value of the experimental class was 81.82, much better than the average value of the control class, namely 70.26. So it can be concluded that the *Math City game learning media* based on character education meets the valid and practical criteria. There is an increase in critical thinking skills, there is individual and classical mastery of students, there is an influence of learning motivation on critical thinking skills and there is an average difference between the experimental class that uses *Math City media* and the control class that does not use *Math City learning media* so that it meets the criteria for effective learning .

The practicality of the Math City game learning media was obtained based on the results of student and teacher responses (Sobiroh & Suwarno, 2023) . The results of student responses were obtained:

Table 9:
Practical Student Responses

Assessment Aspects	Average	Criteria
Content Quality	3.72	Very Practical
Media Quality	3.00	Practical
Engineering Quality	3.50	Very Practical
Overall Average	**3.40**	**Very Practical**

Based on the recapitulation results of calculating the responses of experimental class students, the results showed that the *Math City game learning media* developed was

in the interval 3.25 ≤ X ≤ 4.00 with very practical criteria. An average of 3.40 shows that learning media gets a good response when applied in learning (Fajarwati et al., 2023) . The practicality of the results of the teacher's response is as follows:

Table 10:
Practicality of Teacher Responses

Assessment Aspects	Average	Criteria
Content Eligibility	3.50	Very Practical
Language Eligibility	3.00	Practical
Engineering Quality	3.00	Practical
Appearance	3.00	Practical
Overall Average	**3.12**	**Practical**

Based on teacher response calculations, the results showed that the *Math City game learning media* was in the interval 2.50 ≤ X < 3.25 with practical criteria. The practicality results of the *Math City* game media are an average of 3.26.

The fifth stage of evaluation (*Evaluation*) is divided into two stages, namely formative evaluation and summative evaluation. The formative evaluation stage is carried out at the end of each development stage process. Evaluation at the analysis stage limits the problems found in the research. Evaluation at the design stage is focused on the design results which are the basis for product development. Evaluation of the development stage is carried out in accordance with media revisions according to suggestions and comments from media expert validators and material experts. Evaluation of the implementation stage was carried out on the results of limited trials and field trials. Overall, the results obtained show that the *Math City game media* meets valid criteria and meets practical criteria.

The summative evaluation stage is carried out at the end to find out whether the learning media products developed still need to be revised. Summative evaluation is carried out after learning using the *Math City game media* and giving *pre-test* and *post-test* as well as evaluation test questions which have previously been tested for validity, reliability, distinguishing power and level of difficulty of the questions in the trial class. The initial *pre-test score* was obtained before learning was carried out using the *Math City game media* , while the final *post-test score* was obtained after students were given learning using the *Math City game learning media* . Evaluation test scores will be used to measure whether there is a difference between the control class and the experimental class

Conclusion

Based on the results of research conducted in the previous chapter, it can be concluded that:

1. *The Math City* game learning media based on character education meets valid criteria. The media expert validation results obtained an average of 3.64 and material experts 3.96 with an overall average of 3.80. Based on this, the *Math City game learning media* based on character education is valid.
2. *The Math City* game learning media based on character education meets practical criteria. The student response results obtained were an average of 3.40 and the teacher response was 3.12 with both averages being 3.26. So it can be said that the *Math City game media* is based on practical character education.
3. *Math City* game learning media based on character education can significantly improve critical thinking skills. This was obtained based on the results of the *N-Gain test* for the experimental class which used the *Math City game media* which

was 15.43 higher compared to the control class which did not use the media which was only 5.94 with an average N- *Gain* score for the experimental class of 0.453824 and the control class average score was 0.1747. The results of this calculation show that the control class is in the *N-Gain interval* < 0.30 with low criteria. Meanwhile, the experimental class is in the interval 0.30 < *N-Gain* ≤ 0.70, medium criteria. The average value of *the independent sample t-test post-test* score for the experimental class and control class obtained a significance result of 0.000 > 0.05, so H_0 was rejected and H_1 was accepted so that there was a difference in the average of the experimental class that used media and the control class that don't use media.

4. *the Math City* game learning media based on character education is effective with proof that:
   a. Individual and classical student completion of critical thinking skills achieved a score above KKTP 71, namely 81.82 with 85% with a classical percentage of 94.117% with data of 32 students completing and 2 students not completing.
   b. There is an influence of learning motivation on students' critical thinking abilities of 20.4%.
   c. There is a difference in the average critical thinking ability of the experimental class of 81.82 and the control class of 70.26

SUGGESTION

Based on the results of research on the development of the *Math City game learning media* based on character education that has been carried out, it is hoped that all the shortcomings and weaknesses of the researchers can be used as further product development with the following suggestions:

1. *The Math City* game learning media based on character education can be developed with *multi players.*
2. *The Math City* game learning media can be developed in various other mathematics materials
3. *The Math City* game learning media can be created on a server so that teachers can monitor it directly when students use it

THANK YOU NOTE

Thank you to the supervisors who have collaborated in carrying out research on the development of this learning media. There is great hope that this research will be useful and allow it to be used as future research that is more developed in finding digitalization-based learning media in mathematics learning.

REFERENCES

Efendi, N. M. (2019). Revolusi Pembelajaran Berbasis Digital (Penggunaan Animasi Digital Pada Start Up Sebagai Metode Pembelajaran Siswa Belajar Aktif). *Habitus: Jurnal Pendidikan, Sosiologi, & Antropologi*, *2*(2), 173. https://doi.org/10.20961/habitus.v2i2.28788

Facione, P. A. (2020). Critical Thinking: What It Is and Why It Counts 2020 Update. In *Insight assessment: Vol. XXVIII* (Issue 1).

Fajarwati, A. A., Nugraheni, P., & Purwaningsih, W. I. (2023). Pengembangan Media Pembelajaran Interaktif Berbasis Kontekstual Menggunakan Articulate Storyline 3 Pada Materi Pola Bilangan Untuk Membantu Pemahaman Konsep. *RANGE: Jurnal Pendidikan Matematika*, *4*(2), 254–266. https://doi.org/10.32938/jpm.v4i2.3653

Firdaus, N. M., & Robandi, B. (2023). Efektivitas Penggunaan Teknologi Internet Dalam Mencari Pengetahuan Dan Keterampilan Bagi Warga Belajar Pkbm. *Comm-Edu (Community Education Journal)*, *6*(1), 6. https://doi.org/10.22460/comm-edu.v6i1.7527

Gunawan, A. S., Marianti, A., & Kamari, P. (2022). Analisis Kemampuan Berpikir Kritis Siswa Smp Dalam Menyelesaikan Soal Terkait Materi Hereditas. *BIO-EDU: Jurnal Pendidikan Biologi*, *7*(2), 125–133. https://doi.org/10.32938/jbe.v7i2.2006

Hidayati, N., & Rezania, V. (2023). Pengembangan Game Edukasi East Java Culture Pada Pembelajaran Pendidikan Pancasila Di Kelas 4 Sekolah Dasar. *Paedagoria : Jurnal Kajian, Penelitian Dan Pengembangan Kependidikan*, *14*(3), 301–312.

Isyarotullatifah. (2019). Pengembangan Konten E-Learning Simulasi Digital Berbasis Proyek Untuk Siswa Kelas X Di Smk Negeri 1 Kubutambahan. *Jurnal Teknologi Pembelajaran Indonesia*, *9*(1). https://doi.org/10.23887/jtpi.v9i1.2887

Kemdikbud. (2019). Konsep dan Pedoman Penguatan Pendidikan Karakter Tingkat Sekolah Dasar dan Sekolah Menengah Pertama. *Kementerian Pendidikan Dan Kebudayaan Republik Indonesia*, 8.

Lubis, D. A., Arianto, L., Ashari, I. M. Al, & Amidi. (2021). Pembelajaran Matematika Budaya (Etnomatematika) Berbantuan Aplikasi Math City Map untuk Meningkatkan Kemampuan Berpikir Kritis Peserta Didik. *Journal of Educational Integration and Development*, *1*(3), 2021.

Mardiyanti, A. S. (2020). Analisis kemampuan berpikir kritis dan kreatif dalam pemecahan masalah matematika berdasarkan kemampuan matematika siswa. *EKSPOSE: Jurnal Penelitian Hukum Dan Pendidikan*, *19*(1), 939–946.

Maryana, Suaedi, & Nurdin. (2019). Pengembangan Media Pembelajaran Matematika Menggunakan Powerpoint Dan Ispring Quizmaker Pada Materi Teorema Pythagoras. *Jurnal Penelitian Matematika Dan Pendidikan Matematika*, *2*(2), 53–61.

Mawarsari, V. D., Larasati, N. B., & Sulistyaningsih, D. (2024). "Geometrical Land" Learning Media Design Material for Building Flat Side Spaces. *Hipotenusa: Journal of Mathematical Society*, *6*(1), 61–75. https://doi.org/10.18326/hipotenusa.v6i1.1124

OECD. (2019). Pendidikan di Indonesia belajar dari hasil PISA 2018. *Pusat Penilaian Pendidikan Balitbang KEMENDIKBUD*, *021*, 1–206.

Prawidia, I., & Khusna, H. (2021). Pengaruh suasana lingkungan belajar dan minat belajar siswa terhadap hasil belajar matematika. *Jurnal Penelitian Pembelajaran Matematika Volume*, *14*, 192–207.

Rahayu, K. N. S. (2021). Sinergi pendidikan menyongsong masa depan indonesia di era society 5.0. *Edukasi: Jurnal Pendidikan Dasar*, *2*(1), 87–100.

Rahmasantika, D., & Prahmana, R. (2022). MATH E-COMIC CERITA RAKYAT JOKO KENDIL DAN SI GUNDUL UNTUK MENUMBUHKAN KEMAMPUAN BERPIKIR KRITIS SISWA TUNARUNGU. *Jurnal Program Studi Pendidikan Matematika*, *11*(2), 787–805.

Santika, I. W. E. (2020). Efektifitas. *Indonesian Values and Character Education Journal*, *3*(1), 8–19.

Sobiroh, N. I., & Suwarno. (2023). Pengembangan Perangkat Pembelajaran Model Means Ends Analysis untuk Mengajarkan Koneksi Matematis Peserta Didik. *Gammath : Jurnal Ilmiah Program Studi Pendidikan Matematika*, *8*(2), 120–134. https://doi.org/10.32528/gammath.v8i2.756

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta*.

Sulistyaningrum, H., Winata, A., & Cacik, S. (2019). Analisis Kemampuan Awal 21st Century Skills Mahasiswa Calon Guru SD. *Jurnal Pendidikan Dasar Nusantara*, *5*(1), 142. https://doi.org/10.29407/jpdn.v5i1.13068

Utami, S. F., & Leonard, L. (2023). Pengembangan Media Pembelajaran Matematika Kartu U-Math (Uno Mathematics). *Research and Development Journal of Education*, *9*(2), 566. https://doi.org/10.30998/rdje.v9i2.11350