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Research Article

Development of Figma Educational Game Based on Mathematics Computational Thinking Ability for Vocational Students

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ABSTRACT

Developing educational games using Figma can help educators create engaging and interactive learning media. This also applies at the vocational school level to improve learning outcomes, especially in mathematics, which students rarely favor because it is considered a complex subject. The main problem faced by vocational students related to employability still needs to be considered higher, which is caused by the lack of availability of interactive media to hone the skills desired by the work industry, including soft skills such as logical thinking and technical functions such as computational thinking. This research aims to create an educational game based on mathematical computational skills in vocational students through a Research and Development (R&D) approach by applying 4 of the five stages of the ADDIE Method, namely Analysis, Design, Development, Implementation, and Evaluation. From the four stages of the ADDIE Model, an Educational Game design using Figma entitled "Train to Mathematics" has been produced by paying attention to important aspects such as material relevance, selection of designs used, user involvement, interactivity, adaptability, and skill enhancement, in designing the concept of educational games. The research results show the feasibility level through the material validation test with a percentage of 70%, and the media validation test obtained a percentage of 80%. The results of the validation test show that the development of educational games using Figma is feasible as learning media.

Keywords: math computing; educational game; figma; vocational school

1. INTRODUCTION

In the modern era, advances in information technology have significantly affected education development. The influence of digital transformation required by the Fourth Industrial Revolution has been felt in higher education (Castro Benavides et al., 2020). In the era of the Industrial Revolution 4.0, soft skills competence is the main focus for almost 90% of industries as a determinant of the employment of vocational school graduates (Turistiati & Ramadhan, 2019), by the views of the American Management Association (AMA), where only 25% of long-term job success depends on hard skills, while 75% depends on soft skills ((Tres) Bishop, 2017).

Research on vocational education and training is gaining importance globally, reflecting increased reciprocal learning and global cooperation in the field (Chen et al., 2021). Applying technical skills and knowledge requires abilities, skills, traits related to interpersonal aspects or character, and technical knowledge (Weber et al., 2011). Vocational education is considered very important in preparing students for work. In vocational education, mathematical computational thinking skills are considered very important. These skills are considered crucial for handling technical tasks and facing challenges in the work environment that require practical mathematical problem-solving abilities. Research has revealed that computational thinking has a significant role in improving students' ability to solve problems (Cervera et al., 2020). Research has been conducted to investigate how students engage in computational thinking and programming activities when solving mathematical problems, highlighting the importance of integrating such skills into educational practice (Hadjerrouit & Hansen, 2020).

There are several issues that educators have to face when teaching mathematics at the vocational level. One of the main problems is students' need for more interest in mathematics, sometimes caused by the assumption that this subject is

difficult to understand and has nothing to do with their future work. Conventional teaching approaches, which are passive and do not interest students or inspire them to learn, are to blame for students' lack of engagement in learning (Frejd & Muhrman, 2022). In addition, vocational education emphasizes the value of mathematics in the vocational high school curriculum. It plays a vital role in equipping students with the technical and interpersonal skills needed for the world of work (OZDEMIR, 2020).

Many countries strive to integrate computing into the curriculum at different levels of education. The fact that human life has been changed by computers in many areas and as a whole encourages innovation in thinking and acting. Therefore, computational thinking is now essential (Maharani, 2020). Computational skills are becoming a prevalent type of literacy in the 21st century and are required to solve problems in various fields (Çoban & Korkmaz, 2021; Grover & Pea, 2021). Researchers have also stated that computational ability should be considered a general domain ability, which is the ability to solve complex problems in daily life (Y. Li et al., 2020). In other words, computational ability involves analyzing data, logically sequencing, and creating solutions by following rules and sequences.

Developing logical thinking, problem-solving, and computational understanding is increasingly important in today's rapidly evolving digital age, especially for vocational students entering the technology-dominated workforce. Research has shown that using technology in the classroom promotes computational thinking in students, which advances their proficiency in probability and mathematical problem-solving (Rodríguez-Benito & Durán-Gómez, 2020). One educational approach studied to improve computational thinking is the use of educational robotics. (Piedade et al., 2020).

The main concern of educators and researchers towards technology in education has encouraged innovative approaches, such as using educational games as an exciting and interactive learning medium. Games have been divided into two categories (M.-C. et al., 2013). without and with role-playing. According to the identification by (Hung et al., 2018), there are eight categories of games: immersive games, tutorial games, training games, simulation games, adventure games, music games, board games, and alternate reality games. Teaching materials such as educational games and Augmented Reality systems have improved students' abstract reasoning, logical thinking, and problem-solving abilities (C. et al., 2022). An innovative way to train logical thinking and computational skills can be found through educational games, which utilize interactive appeal and fun learning experiences.

Figma, an intuitive and collaborative design platform, offers great potential for educational game development. With robust design features and rapid prototyping capabilities, interactive and user-friendly educational games can be designed using Figma. Game elements can be integrated into learning spaces through gamification to increase student engagement and foster a sense of community in the subject (Borrás-Gené et al., 2019). Figma's potential in educational game development is further supported by its role in facilitating collaborative ideation experiences, essential for designing engaging and effective educational games (Das et al., 2024).

This research aims to create an educational game based on mathematical computational thinking skills in vocational students specifically designed using Figma through a Research and Development (R&D) approach by applying 4 of the five stages of the ADDIE method, namely Analysis, Design, Development, and Evaluation. This approach allows the identification of appropriate educational game characteristics and the measurement of their impact on student learning. The following are indicators of computational thinking according to (Maharani, 2020; Olawsky, 2011).

Table 1. Computational Thinking concepts and competencies

Conceptual	Competence
Abstraction	Relating to Complexity through the reduction of unnecessary elements
Algorithms	Identify sequences
Decomposition	Breaks an artifact, process, or system into components
Generalization	Identifying patterns and commonalities between artifacts, processes, or systems
Logic Analysis	Applying and interpreting Boolean logic
Evaluation	Systematic produces demonstrable values for judgment.

The research aimed not only to produce an effective educational game but also to contribute to our understanding of the use of technology in vocational education. It is hoped that the results of this research can provide new insights into how technology can be integrated into the vocational curriculum in innovative and beneficial ways to student development.

2. RESEARCH METHOD

This study used a Research and Development (R&D) approach to develop a new instructional model that integrates concepts from the ADDIE model, emphasizing early development through to evaluation. The ADDIE model has effectively been used to create and evaluate educational games to improve computational thinking and logical reasoning skills. Research has shown that digital games designed using the ADDIE model have contributed to improving digital competence and computational thinking. (Esteve-Mon et al., 2020). The research stages carried out in this study obtained four of the five stages of the ADDIE development model, namely (1) analysis, analyzing the needs of the subject matter of the Learning Model, collecting information about the problems that exist in learning activities, identifying solutions to overcome these problems, and identifying concepts in one of the Computational Thinking questions and detailing the concepts that will be filled and developed into multimedia (educational games) (2) design, at this stage it is done by making storyboards, making Design Layout, designing game characters, designing game navigation structures, and choosing Figma Studio as the software used. (3) developing interactive multimedia, namely assembling educational games by combining characters, backgrounds, and sound effects and inserting material and questions. (4) evaluation stage (evaluate), namely conducting formative evaluations of two material experts (two lecturers from mathematics education) and two media experts (mathematics education lecturers who have expertise in technology) as feedback to make improvements using a validation sheet questionnaire. The media validation sheet includes general aspects, software engineering, visual communication, and audio communication, while the material validation sheet includes aspects of learning and material.

This study used several data collection instruments to determine the feasibility of using educational games. These instruments, such as material validation sheets and media validation sheets, were distributed to validators, including material and media experts (Liu et al., 2021). These instruments play an essential role in assessing the effectiveness and suitability of educational games for learning purposes. The material validation sheet is given to the validator as a material expert to review the quality of the material in the product in terms of the suitability of the material content, the learning strategy aspect, and the effectiveness of the material. The material validation sheet contains questions that lead to each of these aspects. Each question on the material validation sheet will have five alternative answers that lead to a Likert scale so that the material expert validator will choose the answer as a checklist. The media validation sheet is given to the validator as a media expert to assess the quality of the media in terms of appearance, design, instructions for use, animation, writing, and audio. The media validation sheet contains questions that lead to these aspects. Each question item on the media validation sheet will have five alternative answers leading to a Likert scale so that the media expert will choose the answer as a checklist.

The data analysis technique of this research is the quantitative descriptive analysis technique. By analyzing the data obtained from the material and media validation results. The validation data obtained from each expert in the form of a score between 0-4 from each question will then be processed and calculated to determine the percentage of feasibility level on each indicator using the formula:

$$P = \frac{score\ obtained}{total\ score\ \times N} \times 100\%$$

Description:

P = validation percentage

N = Number of Respondents

After obtaining the calculation results from the formula above, the next step is to determine the criteria for the success rate of product development to determine product feasibility, which can be presented in the **Table 2**.

Table 2. Percentage of Product Feasibility Criteria

Percentage	Criteria
0 – 20%	Not feasible
21% - 40%	Feasible
41% - 60%	Feasible enough
61% - 80%	Feasible
81% - 100%	Very feasible

(Arthana,2005)

Based on the information above, the educational game "Train to Mathematics" can be called feasible with the acquisition of percentage results of ≥61%.

3. RESULTS AND DISCUSSION

This research has produced an interactive multimedia product in the form of an Educational Game based on mathematical computational thinking skills in vocational students. It uses the ADDIE Method, which is modified into four stages: Analysis, Design, Development, and Evaluation.

3.1 Analysis

At this stage, it analyzes the needs required by users (vocational students) to obtain the latest information. Especially in this study, researchers are looking for information about the problems that vocational school students are experiencing. The computational and logical thinking issues that exist in vocational student learning activities are:

a. The main problem faced by the world of work today is that the perception and expectations of the world of work on the work skills that vocational students should possess still need to be improved, even if they are non-existent. (S. Munadi, et al. 2018).
b. Inadequate Computational Thinking Skills: Several studies report that vocational students lack the necessary computational thinking skills crucial for problem-solving and critical thinking. (Mohd Rosli & Mohd Matore, 2023).
c. Limited Use of Educational Games: Although some studies show that educational games can improve critical thinking skills, there is a need for further research on the effectiveness of these games in vocational education. (Samin, et al. 2021).

Based on the information obtained, the researchers designed an interactive learning medium based on educational games. This is expected to be a solution for honing the computational and logical thinking skills of vocational students.

3.2 Design

The educational game concept was designed in this step using the information obtained during the needs analysis. The design stage of interactive multimedia based on educational games resulted in a design concept derived from one computational ability question taken from the 2018 high school level Bebras book (BukuBebras2018 SMA v.5, 2018), which is a collection of questions containing computational thinking skills developed into an interactive game. The following is a table of questions included in the educational game that the researcher created, which is presented in the form of multiple choice.

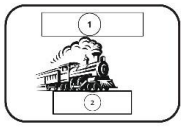
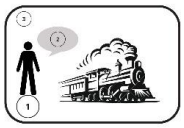
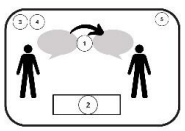
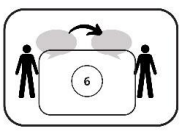
Table 3. Questions presented in the Educational Game

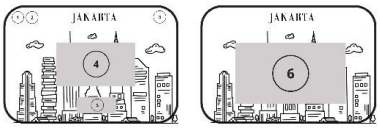
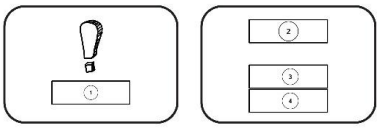
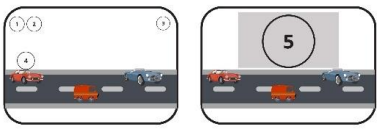
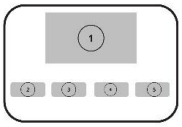
No.	Indicators	Questions
1	Problem Solving	A builder wants to build a fence that is 15 meters long and 2 meters high. If each square meter requires 10 logs, how many materials are needed to make the wall?
2	Decomposition	An electrician needs to fix a lamp that is not working. Steps include checking the electrical wiring, replacing the bulb, and checking the switch. What should the electrician do if the light still doesn't come on after these steps?
3	Pattern Recognition	An arithmetic sequence starts with the number 3; each subsequent number increases by 5. What is the 8th number in the sequence?

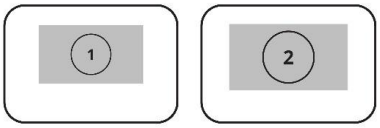
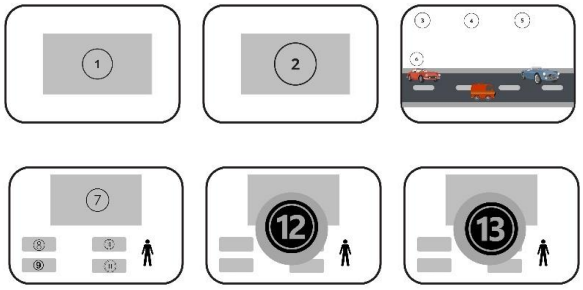
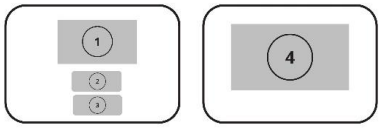
4	Abstraction	How far has the car traveled if a vehicle moves at an average speed of 60 km/h for 3 hours?
5	Algorithm	Choose an algorithm with the following situation: To make his job easier, a man needs a simple program to help him find out the volume of a tubular object.
6	Analysis	A clothing store has a revenue of Rp5,000,000 in one month. If the operating cost is IDR2,000,000 and the procurement cost is IDR1,500,000, what does the shop earn the net profit in that month?
7	Generalization	If a production process takes 30 minutes to complete each product unit, how much time is needed to complete ten units?
8	Optimization	A company has 600 liters of paint to paint a building. Each liter of paint is enough to paint ten m^2. What is the maximum area that can be painted with the available paint?
9	Creativity	Make a creative plan to optimize the use of raw materials in the production process by reducing waste.
10	Collaboration	A construction project requires cooperation between architects, structural engineers, and construction workers. How can they work together effectively to complete the project on time and to the desired standard?

Researchers used the Canva website and, of course, the Figma application to create the game display design; this aims to produce an attractive and innovative design that will attract users' interest.

Table 4. Storyboard of educational game "Train to Math"

No.	Figure	Explanation
1.		Initial view: 1. Title of the educational game "Train to Mathematics" 2. "Start" menu
2,		Animated Introductory Display: 1. The animation used, named "Bobi" 2. Introduction dialog 3. "Home" menu
3.	 	Game rules display: 1. Rules dialog between boss and Bobi 2. Menu to display instructions 3. "Home" menu 4. "Back" menu

		5. "next" menu 6. Display the details of the rules
4.		Display Instructions for train departure schedule: 1. "home" menu 2. "back" menu 3. "next" menu 4. Explanation of the problem 5. Menu to display the train schedule 6. Train schedule details
5.		Appeal and game options: 1. Appeal text 2. Question whether to proceed to the game 3. "Next" option menu 4. "Back" option menu
6.		The game display starts: 1. "Home" menu 2. Game time display 3. Display of Score obtained 4. The car Bobi is driving
7.		Display of questions that must be answered: 1. Questions that must be answered 2. Answer choice 1 3. Answer choice 2

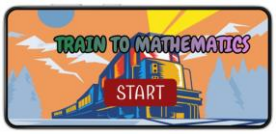
		4. Answer choice 3 5. Answer choice 4
8.		Display Response of the question-answer: 1. Display of wrong answer "Game Over" 2. Correct answer display "You Win"
9.		Next Level display: 1. Display "Next Level" 2. Display of rules that apply in the next level session 3. Time display 4. Display of the minimum score that must be achieved 5. Display of the Score obtained 6. The car drove by Bobi 7. Questions that must be answered 8. Answer choice 1 9. Answer choice 2 10. Answer choice 3 11. Answer choice 4 12. Correct answer response 13. Wrong answer response
10.		Final View: 1. Question if you want to try playing again 2. Answer option "Yes" 3. Answer choice "No"

		4. Thank you for trying the faith.

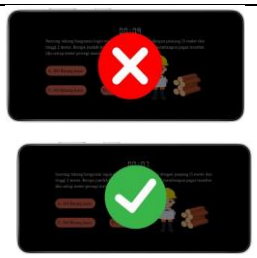
3.3 Development

This stage is carefully structured by considering the selection of topics that are in accordance with the designed content standards, identification of problems that need to be solved, setting student learning objectives, adjusting the situation and design environment with the problems taken as the main content source, as well as the module content and learning process planned to achieve these objectives (Sahaat et al., 2020). Table 5 will present the displays available in the "Train to Mathematics" game that has been designed by the researcher.

Table 5. Display of "Train to Mathematics" educational game

No.	Image	Explanation
1.	 Initial View	The researcher chose to adopt the theme of trains in this game because the researcher chose one of the questions in the 2018 Bebras book for the high school level (BukuBebras2018 SMA v.5, 2018), which has a theme about trains. So, on the initial screen, the game is illustrated with a train picture. This game is named "Train to Mathematics" to demonstrate the concept of learning while playing, primarily as a medium to train mathematical computing skills for vocational students.
2.	 Animation introduction view	In this view, the researcher introduces one of the animations used as an office worker character named Bobi.
3.	  Game Rules display	On the display are the game rules that the user of the educational game must observe. The rules that must be obeyed by the employee (Bobi) in the third view of this game include: 1. Working hours start at 08:00 WIB 2. Employees will be fined if they are late, at a rate that doubles every 15 minutes. 3. The fine amount is Rp15,000.
4.	  Train schedule display	This view presents a case where Bobi is delayed due to traffic. To minimize the fines he receives, Bobi needs a cheap and fast train so that the money received by Bobi is sufficient to buy train tickets according to the existing schedule. The following is a detailed table of train departure schedules and ticket prices in the educational game "Train to Mathematics."
5.	 	In this view, an appeal reads, "Make sure the timetable table is remembered". This aims to ensure that the player remembers the train departure schedule to be able to answer the question at the end. Next, there is an option to continue the game or return to the previous case view.

	Appeal displays an option to proceed to the game	
6.	 Game View	In this game, the car used by Bobi is red, and the vehicle must try to pass other cars to collect the coins presented. When the car hits a coin, the player will receive Rp1000, while if the car hits another vehicle, the money will be reduced by Rp1000. The game lasts for 30 seconds and will automatically stop when the time runs out, then will display the total money earned during the game.
7.	 Display of questions that must be answered	In this display, the player must answer the question: "With the money earned, which train should Bobi take so that even though he is late, the fine is still the cheapest?" This question requires players to estimate which train Bobi can choose by considering the money earned in playing the game and the train travel time to get the lowest fine according to the previously displayed departure schedule table.
8.	 Display of wrong and right answers to questions	In this view, a response is displayed when the player answers a question, whether the answer is correct or incorrect. Correct answers will display "YOU WIN", while wrong answers will display "GAME OVER".
9.	 Next Level Display and Rules in the next level	After correctly answering the questions in the initial level, the player will be given a display to proceed to the next level. In this level, the player will face challenges that are more difficult than the previous level' the Rules that apply as follows: 1. Every time the car hits a coin, there is a question that must be done 2. the time limit given to answer the question is 10 seconds 3. If correct, get a score of 1000 4. If it is wrong and the time given has expired, then it will not get a score 5. To complete this level, the player must get a score of at least 7000
10.	 Game view and display of questions that must be answered	At this stage, the player must run the game, similar to the previous level; the player still has to direct the car to get the coins that have been provided. However, when the vehicle hits the coin, there will be a display of questions that must be answered. The questions are displayed within 10 seconds; if the answer is wrong and does not answer because the time runs out, then the player will not get a score, but if the player answers the question correctly, it will get a score of 1000. To complete this level, the player must collect a minimum score of 7000, which means they must answer seven questions correctly.

11.	 Wrong and right answer display	In this view, the response is presented when the player answers the question, both the correct and wrong answers.
12.	 Response display of the final result at the advanced level	In this view, the response is presented when the player completes the next level; if the player finishes by getting a minimum score of 7000, the player has achieved this session well; the response shown is "YOU WIN". At the same time, if the player fails to collect a minimum score of 7000, which means the player has not been able to complete this level well, the response that will be shown is "GAME OVER".
13.	 Final View	In this view, a follow-up response to the "YOU WIN" and "GAME OVER" views is shown in response to correct or incorrect answers. If the "YOU WIN" display appears, the player will be presented with a final display containing a thank you, such as "Thank you for completing this game". Meanwhile, if "GAME OVER" appears, the player will be given a choice whether or not to try again, such as "Do you want to try again?" with two options: "Yes" or "No". If the player chooses "Yes", the display will return to the beginning of the game. If the player chooses "No", the display will return to the beginning of the game.

3.4 Evaluation`

At this stage, the product will go through a validation process by material and media experts. Validators are chosen because they have expertise in each field. Researchers conducted a validation stage with a material validator by Mrs. Nurul Ikhsan K., S.si., M.Pd. and a media validator by Mr. Dr. M. Dadan Sundawan, M.Pd. on June 12 & 13, 2024. Material validation is done by filling out a material validation sheet containing ten statements and checking the score between 0-4 with the results:

Table 6. Material Test Validation Acquisition

No.	Statement	Score
1.	The suitability of the questions used in the "Train to Mathematics" educational game with indicators of computational thinking skills	2
2.	The educational game "Train to Mathematics" questions are suitable for the research objectives	3
3.	Suitability: The level of difficulty in the questions presented in this educational game with vocational students	3
4.	The questions used in the educational game "Train to Mathematics" can sharpen students to improve their mathematical computational thinking skills	3
5.	The accuracy of the sentence structure used in conveying questions in the educational game media "Train to Mathematics"	3
6.	The sentences used in presenting the questions in the educational game "Train to Mathematics" are easy to understand by students	3

7.	The questions presented in the educational game "Train to Mathematics" are varied	3
8.	The number of problems presented is sufficient for students to hone their mathematical computational thinking skills	3
9.	The content of the educational game "Train to Mathematics" as a whole can motivate students to learn mathematics in general	2
10.	The educational game "Train to Mathematics" is effectively applied to improve the computational thinking ability of vocational students	3
	Grand Total	28

Based on the results in the table above, calculations can be made using the following formula:

$$P = \frac{score\ Obtained}{Total\ score \times N} \times 100\%$$

$$P = \frac{28}{40 \times 1} \times 100\%$$

$P = 70\%$

The calculation above shows that the educational game "Train to Mathematics" scores 70%, which means that "Train to Mathematics" is included in the feasible criteria, with some improvement input. The input submitted is that the question content is better adapted to the title of the game, namely "Train to Mathematics."

Next are the improvements made according to the suggestions and input given by the material expert validator.

Table 7. Details of material revisions after validation test

No.	Indicators	Problem (Before revision)	Problem (After revision)
1.	Problem Solving	A builder wants to build a fence that is 15 meters long and 2 meters high. If each square meter requires 10 logs, how many materials are needed to make the wall?	A railroad maintenance officer wants to build a protective fence along the railroad tracks. The wall will be 15 meters long and 2 meters high. How many materials are needed to make the fence if each square meter requires 10 logs?
2.	Decomposition	An electrician needs to fix a lamp that is not working. Steps include checking the electrical wiring, replacing the bulb, and checking the switch. What should the electrician do if the light still doesn't come on after these steps?	A railroad company charges the following for travel: - Adult ticket: IDR 100,000 - Child ticket: IDR 50,000 If there are 120 adult passengers and 80 child passengers on one trip, calculate the total revenue from tickets and elaborate on the calculation of the cost of each type of ticket.
3.	Pattern Recognition	An arithmetic sequence starts with the number 3; each subsequent number increases by 5. What is the 8th number in the sequence?	A new train station is built along a railroad line, where the distance between stations increases regularly. The first station is at the 3rd kilometer from the starting point, and each subsequent station is built 5 kilometers from the

			previous station. What is the distance of the 8th station from the starting point?
4.	Abstraction	How far has the car traveled if a vehicle moves at an average speed of 60 km/h for 3 hours?	A train moves at an average 60 km/h speed for 3 hours. How much distance has the train traveled?
5.	Algorithm	Choose an algorithm with the following situation: To make his job easier, a man needs a simple program to help him find out the volume of a tubular object.	Choose an algorithm with the situation below: An officer at a railway company wants to know the volume of a tubular fuel tank with a base radius of 2 meters and a height of 5 meters. What algorithm should be used to calculate the volume of the tank?
6.	Analysis	A clothing store has a revenue of Rp5,000,000 in one month. If the operating cost is IDR2,000,000 and the procurement cost is IDR1,500,000, what does the shop earn the net profit in that month?	A railroad repair company has a revenue of Rp5,000,000 in one month. If its operating cost is IDR2,000,000 and the cost of railroad repair is IDR1,500,000, how does the company earn that month's net profit?
7.	Generalization	If a production process takes 30 minutes to complete each product unit, how much time is needed to complete ten units?	If a railroad repair takes 30 minutes to complete each unit of repair, how long will it take to complete 12 units of repair?
8.	Optimization	A company has 600 liters of paint to paint a building. Each liter of paint is enough to paint ten m^2. What is the maximum area that can be painted with the available paint?	A railway company has 600 liters of paint to use to maintain and repair railways. Each liter of paint is enough to paint ten m^2. What is the maximum area that can be painted with the available paint?
9.	Creativity	Make a creative plan to optimize the use of raw materials in the production process by reducing waste.	As part of a continuous effort to improve efficiency and sustainability in railway repair, devise a creative plan to optimize the use of raw materials in the production process by reducing waste.
10.	Collaboration	A construction project requires cooperation between architects, structural engineers, and construction workers. How can they work together effectively to complete the project on time and to the desired standard?	A railroad construction project requires cooperation between architects, structural engineers, and construction workers. How can they work together effectively to complete the project on time and to the desired standard?

Media validation is carried out by filling out a media validation sheet containing ten statements and checking the score between 0-and 4 with the results:

Table 8. Media Test Validation Gain

No.	Statement	Score
1.	The attractiveness of the appearance design of the educational game "Train to Mathematics"	3
2.	Clarity of the images used in the educational game "Train to Mathematics"	4
3.	Clarity of navigation in the operation of the educational game "Train to Mathematics"	3
4.	Clarity of instructions for using the educational game "Train to Mathematics"	3
5.	The use of color variations in the educational game "Train to Mathematics" is exciting and appropriate	4
6.	The font size used in the educational game "Train to Mathematics" is correct	3
7.	Educational game media "Train to Mathematics" is easy to use and simple to operate	3
8.	Overall attractiveness of media packaging	3
9.	The design made in the educational game "Train to Mathematics" is suitable for vocational students	3
10.	The concept of flow used in the educational game "Train to Mathematics" is suitable for vocational students	3
	Grand Total	32

Based on the results in the table above, calculations can be made using the following formula:

$$P = \frac{score\ obtained}{Total\ Score\ \times N} \times 100\%$$

$$P = \frac{32}{40 \times 1} \times 100\%$$

$P = 80\%$

The calculation above shows that the educational game "Train to Mathematics" received a score of 80%, which means that "Train to Mathematics" is included in the sift criteria, with some improvement input. The suggestions and feedback submitted include clarifying the instructions for the rules of the game (navigation instructions and narration of the game situation at each level) and then adding back sound to the game.

Table 9. Details of Media Revisions after the Validation Test

Before Revision	After Revision
 There are no game navigation instructions or narration describing the situation when the game starts.	 Game navigation instructions and narration describing the situation when the game starts have been added.

From the four stages of the ADDIE Model above, it has succeeded in helping researchers design Educational Games using Figma entitled "Train to Mathematics" by paying attention to important aspects such as material relevance, selection of designs used, user involvement, interactivity, adaptability, and skill enhancement in designing educational game concepts.

4. CONCLUSION

The Research and Development (R&D) approach applies 4 of the five stages of the ADDIE Method, namely Analysis, Design, Development, Implementation, and Evaluation. This educational game was successfully developed through Figma based on mathematical computing skills in vocational students. Through these steps, the "Train to Mathematics" game was successfully built by paying attention to important aspects such as material relevance, design usage, device selection, user involvement, interactivity, adaptability, and skill enhancement. In material testing, the percentage result is 70%, which is a decent description. As for media testing, it gets a percentage of 80% with a decent description. Thus, the conclusion of this study shows that the R&D approach with the ADDIE method has been considered a practical approach to developing educational games based on mathematical computational thinking skills in vocational students. However, some areas for improvement were identified in the academic games created by the researchers.

RECOMMENDATIONS

Based on the results of research and development on Figma-based educational games aimed at creating learning media grounded in mathematical computational thinking skills for vocational students, several recommendations can be considered for further implementation and to enhance the program's effectiveness. First, it is necessary to improve the educational content, such as developing additional levels with varying degrees of difficulty to accommodate different levels of student understanding. The questions presented should also be challenging and relevant to the context of the targeted skills. Second, intensive training for teachers on the use of Figma is essential. Teachers need to understand the best ways to utilize Figma in the learning process and to assess student progress through this platform. Third, strengthening the interactive features in the game is also crucial, for example, by adding a game mode that adjusts the difficulty level based on student performance, so that students remain challenged and motivated to gradually improve their skills. In addition, a blank scribble feature should be added to each question to provide students with space to work out their answers. Fourth, a continuous assessment system needs to be implemented to monitor the development of students' mathematical computational skills. Data from these assessments can be used as feedback for both students and teachers, and as a basis for curriculum adjustments when necessary. Finally, follow-up research is needed to evaluate the long-term effectiveness of this game. Such research could include comparative studies between classes that used the game and those that did not, as well as more in-depth analyses of specific aspects of the game that were most effective in improving students' mathematical computational skills. By implementing these recommendations, it is expected that the Figma-based educational game can become an effective learning tool for supporting vocational students' mathematical computational thinking skills and contribute to the achievement of broader educational goals.

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AUTHOR'S CONTRIBUTIONS

All authors discussed the research results and contributed to the final manuscript from the beginning.

CONFLICT OF INTEREST

The authors have no personal conflicts of interest and do not compete with each other in any way.

REFERENCES

(Tres) Bishop, D. (2017). The Hard Truth About Soft Skills. *Muma Business Review*, *1*(18), 233–239. https://doi.org/10.28945/3803

Borrás-Gené, O., Martínez-Núñez, M., & Martín-Fernández, L. (2019). Enhancing fun through gamification to improve engagement in MOOC. *Informatics*, *6*(3). https://doi.org/10.3390/informatics6030028

BukuBebras2018 SMA v.5. (2018). 1–54.

Castro Benavides, L. M., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital Transformation in Higher Education Institutions: A Systematic Literature Review. *Sensors (Basel, Switzerland)*, *20*(11), 1–22. https://doi.org/10.3390/s20113291

Cervera, N., Diago, P. D., Orcos, L., & Yáñez, D. F. (2020). The acquisition of computational thinking through mentoring: An exploratory study. *Education Sciences*, *10*(8), 1–11. https://doi.org/10.3390/educsci10080202

Çoban, E., & Korkmaz, Ö. (2021). An alternative approach for measuring computational thinking: Performance-based platform. *Thinking Skills and Creativity*, *42*. https://doi.org/10.1016/j.tsc.2021.100929

Das, M., Stangl, A., & Findlater, L. (2024). *" That comes with a huge career cost ": Understanding Collaborative Ideation Experiences of Disabled Professionals*. *8*(April), 1–28. https://doi.org/10.1145/3641018

Esteve-Mon, F. M., Llopis, M. A., & Adell-Segura, J. (2020). Digital competence and computational thinking of student teachers. *International Journal of Emerging Technologies in Learning*, *15*(2), 29–41. https://doi.org/10.3991/ijet.v15i02.11588

Frejd, P., & Muhrman, K. (2022). Is the mathematics classroom a suitable learning space for making workplace mathematics visible?–An analysis of a subject integrated team-teaching approach applied in different learning spaces. *Journal of Vocational Education and Training*, *74*(2), 333–351. https://doi.org/10.1080/13636820.2020.1760337

Grover, S., & Pea, R. (2021). Computational Thinking: A Competency Whose Time Has Come. In *Computer Science Education*. Bloomsbury Academic. https://doi.org/10.5040/9781350057142.ch-003

Hadjerrouit, S., & Hansen, N. K. (2020). Students engaging in mathematical problem-solving through computational thinking and programming activities: A synthesis of two opposite experiences. *17th International Conference on Cognition and Exploratory Learning in Digital Age, CELDA 2020*, *Celda*, 91–98. https://doi.org/10.33965/celda2020_202014l012

Hung, H. T., Yang, J. C., Hwang, G. J., Chu, H. C., & Wang, C. C. (2018). A scoping review of research on digital game-based language learning. *Computers and Education*, *126*, 89–104. https://doi.org/10.1016/j.compedu.2018.07.001

Li, M.-C., & Tsai, C.-C. (2013). Game-Based Learning in Science Education: A Review of Relevant Research. *Journal of Science Education and Technology*, *22*(6), 877–898. https://doi.org/10.1007/s10956-013-9436-x

Li, Y., Schoenfeld, A. H., diSessa, A. A., Graesser, A. C., Benson, L. C., English, L. D., & Duschl, R. A. (2020). Computational Thinking Is More about Thinking than Computing. *Journal for STEM Education Research*, *3*(1), 1–18. https://doi.org/10.1007/s41979-020-00030-2

Liu, Z., Shaikh, Z. A., & Gazizova, F. (2021). *Using the Concept of Game-Based Learning in Education*. *15*(14).

Maharani, A. (2020). Computational Thinking dalam Pembelajaran Matematika Menghadapi Era Society 5.0. *Euclid*, *7*(2), 86. https://doi.org/10.33603/e.v7i2.3364

Mohd Rosli, N., & Mohd Matore, M. E. @ E. (2023). Coding and Computational Thinking Learning for Vocational Students: Issues and Challenges. *International Journal of Academic Research in Business and Social Sciences*, *13*(9). https://doi.org/10.6007/ijarbss/v13-i9/17766

Olawsky, K. J. (2011). 1 Introduction. *A Grammar of Urarina*, *July*, 1–29. https://doi.org/10.1515/9783110892932.1

OZDEMIR, H. (2020). Maths instruction in vocational high school from teachers and students' eyes: a different kettle of fish. *Journal of Research in Mathematics Education*, *9*(2), 196. https://doi.org/10.17583/redimat.2020.3796

Piedade, J., Dorotea, N., Pedro, A., & Matos, J. F. (2020). On teaching programming fundamentals and computational thinking with educational robotics: A didactic experience with pre-service teachers. *Education Sciences*, *10*(9), 1–15. https://doi.org/10.3390/educsci10090214

Rodríguez-Benito, A. J., & Durán-Gómez, M. (2020). Implementation of educational technology for the development of computational thinking in fourth grade children in a public educational institution in Colombia. *Revista Perspectivas*, *5*(2), 20–29. https://doi.org/10.22463/25909215.2827

Sahaat, Z., Nasri, N. M., & Abu Bakar, A. Y. (2020). *ADDIE Model In Teaching Module Design Process Using Modular Method: Applied Topics in Design And Technology Subjects*. *464*(Psshers 2019).

https://doi.org/10.2991/assehr.k.200824.161

Tsai, C. Y., & Lai, Y. C. (2022). Design and Validation of an Augmented Reality Teaching System for Primary Logic Programming Education. *Sensors*, *22*(1). https://doi.org/10.3390/s22010389

Turistiati, A. T., & Ramadhan, H. F. A. (2019). Pelatihan Soft Skills Dan Pendampingan Siswa-Siswi SMK Di Kota Bogor Untuk Persiapan Memasuki Dunia Kerja. *Jurnal Komunitas : Jurnal Pengabdian Kepada Masyarakat*, *1*(2), 1–8. https://doi.org/10.31334/jks.v2i1.286

Weber, M. R., Crawford, A., Rivera, D., & Finley, D. A. (2011). Using Delphi Panels to Assess Soft Skill Competencies in Entry Level Managers. *Journal of Tourism Insights*, *1*(1). https://doi.org/10.9707/2328-0824.1011