

MMZ: A Study on the Implementation of Mathematical Game-based Learning Tool

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Abstract— Mathematic has always been one of the hardest subject to be learnt during school. This is the very same issue that student have been facing no matter the level of education that they are in, and this is the reason why Math Maze Zone or also known as MMZ had been developed. MMZ is a mathematical game-based learning tool for primary school students to help them prepare for their final examination for the mathematics subject. The proposed game will consist of mathematical questions and the game design will be focusing on a maze where user will have to search for a way out from the maze while going through the checkpoint within the maze. The checkpoint will consist of mathematical questions and when user answered correctly, they will be able to continue their journey to explore the maze. MMZ focused on 1 chapter only for now which is Chapter 8: Space and Shape. Although the game only consists of one-chapter, primary school students can play the game to enhance their knowledge and to help them to be more engaged with mathematics subject by playing the game. The results will be taken from the perspective of adult who have close relationship with standard six students. Five main sections will also be identified along with MMZ to ensure getting a good result.

Keywords—Primary school; educational mathematic game; game components

I. INTRODUCTION

Having a high level of proficiency in math is vital for the economic success and growth of societies, as math is used in a wide range of fields and industries, including finance, science, engineering, and technology. Developing strong math skills can also open numerous career opportunities and increase an individual's earning potential [1][2]. There are few reasons as to why this is happening in which some students may not be interested in math, which can make it harder for them to learn and retain information. Other than that, Math can be abstract and difficult to understand, especially if students have not developed a strong foundation in math concepts. Moreover, Math also requires practice and repetition to fully understand and master concepts. If students do not have enough opportunities to practice or do not have access to support and resources, it can be harder for them to learn math [3][4].

With pandemic happening and children are unable to go to school for a long period of time, they are relying on the interactive media technology to gain more information and knowledge while staying at home. Not to mention, these children, especially standard 6 students in primary school will still have to take an important exam which will determine

which high school will they further their studies in. One of the methods for them to gain knowledge while learning for their future examination is through watching education videos on YouTube of, they can also play educational games that is related to their school syllabus. Higher availability, flexibility, and affordability of tertiary online education have also proved to have the potential to enable high-quality student learning. [5]

For this research, developing a mathematical interactive game that is suitable and matched the syllabus with primary school student to prepare for their examination will be done. The game will be called MMZ and will consist of mathematical questions. The game design will be focusing on a maze where user will have to search for a way out from the maze while going through the checkpoint within the maze.

The checkpoint will consist of mathematical questions and when user answered correctly, they will be given points. This research will be aimed to develop an educational mathematical game design that will help the primary school student where they can utilize the mathematics questions for their examination. MMZ will also include 5 different components to measure the effectiveness of the game such as the learning comprehension, user-friendliness, process of user learning, creative and critical thinking, and the effectiveness of MMZ towards the user.

There will be 4 sections that will be discussed in this research, which is section II, Background of the research that consist of mathematics examination and existing similar mathematic games. Section III, Methodology which consist of experimental setup and game design. Section IV, Results, and Section V, Conclusion.

II. BACKGROUND OF RESEARCH

A. Mathematics Examination

In Malaysia, students must take exams and assessments to move forward in their education. These results help them have a better chance to continue their studies. Although it is not the best way to measure a student's performance, it is currently the only way. For example, primary students must take final exams to have a chance to attend prestigious schools. Even though the UPSR exam is no longer used, students still need to learn math to move on to high school, especially as it relates to physics [6].

In Malaysia and worldwide, Mathematics is a crucial subject in schools. Students must master arithmetic to be

successful in math. Without this skill, they will have difficulty solving real-world problems. Since problem-solving is a vital part of math education, researchers have studied the success of problem-solving lessons [7]. To get into prestigious secondary schools, students need to do well in Mathematics, as it is a crucial subject. According to the National Council of Teachers of Mathematics, math is a widely used language that is important for communicating with people from different cultures and countries [8]. Other than that Mathematics are also a compulsory passing subject in Malaysian public examinations such as entrance examination and SPM.

In 2019, many students in Malaysia received an E grade in mathematics on the UPSR exam, ranking it as the second highest subject for E grades, according to the Ministry of Education Malaysia. English had the highest percentage of E grades, with 23.34% in writing and 14.87% in comprehension with Mathematics as the second subject with a 16.87% E grade percentage [9]. Below is the graphical illustration related to the comparison of percentages in every subject between 2018 and 2019 that can be seen in Fig. 1.

Kod & Nama Mata Pelajaran	Tahun	Peratus						Bilangan Calon
		A	B	C	D	Mencapai (A → D)	E	
011 - Bahasa Melayu-Pemahaman	2019	26.91	30.29	26.66	12.74	96.60	3.40	332,610
	2018	26.99	29.95	25.68	13.28	95.90	4.10	328,939
012 - Bahasa Melayu-Penulisan	2019	29.39	32.27	20.60	13.07	95.33	4.67	332,694
	2018	25.96	31.44	24.10	13.14	94.64	5.36	328,990
013 - Bahasa Inggeris-Pemahaman	2019	11.56	19.68	23.19	30.70	85.13	14.87	332,660
	2018	12.55	19.32	22.33	28.91	83.11	16.89	329,021
014 - Bahasa Inggeris-Penulisan	2019	11.54	8.86	21.04	35.22	76.66	23.34	332,648
	2018	11.18	7.02	20.17	36.18	74.55	25.45	329,024
015+025+035 - Matematik	2019	19.43	16.84	16.63	30.23	83.13	16.87	431,610
	2018	18.22	15.52	16.96	29.80	80.50	19.50	427,126
018+028+038 - Sains	2019	9.76	30.53	35.95	20.33	96.57	3.43	431,635
	2018	10.31	31.25	33.77	20.79	96.12	3.88	427,151
021 & 031 - Bahasa Melayu-Pemahaman	2019	14.77	24.02	24.00	26.90	89.69	10.31	99,059
	2018	17.71	24.35	23.06	24.69	89.81	10.19	98,108
022 & 032 - Bahasa Melayu-Penulisan	2019	25.39	16.04	28.84	17.47	87.74	12.26	99,058
	2018	23.36	17.24	28.41	17.20	86.21	13.79	98,113
023 & 033 - Bahasa Inggeris-Pemahaman	2019	20.69	21.84	23.11	21.42	87.06	12.94	99,086
	2018	20.10	23.56	21.65	23.05	88.36	11.64	98,142
024 & 034 - Bahasa Inggeris-Penulisan	2019	15.51	17.53	23.80	25.40	82.24	17.76	99,088
	2018	14.86	16.45	24.17	24.08	79.56	20.44	98,144
026 - Bahasa Cina-Pemahaman	2019	17.26	31.07	22.83	19.34	90.50	9.50	85,632
	2018	15.85	32.48	21.03	20.03	89.39	10.61	84,876
027 - Bahasa Cina-Penulisan	2019	28.88	23.60	26.34	11.24	90.06	9.94	85,633
	2018	25.93	24.34	28.17	13.54	91.98	8.02	84,876
036 - Bahasa Tamil-Pemahaman	2019	22.81	33.19	19.75	14.24	89.99	10.01	13,448
	2018	19.71	33.42	18.48	16.06	87.67	12.33	13,252
037 - Bahasa Tamil-Penulisan	2019	31.22	34.11	18.69	8.51	92.53	7.47	13,448
	2018	31.54	34.73	18.42	7.70	92.39	7.61	13,255

Fig. 1. Illustration of the comparison of percentage in each subject between 2018 – 2019 [8]

B. Existing Similar Mathematic Games

In this part, reviews about several existing games both in Malaysia and other countries that will be discussed along with

other existing games related to mathematics subject. The comparison MMZ with the other three existing games between the games developed by Malaysian and by other countries will also be discussed. There are six existing mathematics games and system that provide a similar kind of function with MMZ but have different kind of approach but are still using the same concept while developing for the game.

It can be observed that many games developed both in Malaysia and other countries share similarities in that they align with school syllabuses, which can aid students in better understanding the topics taught in school. The distinctions can be seen in Tables I and II, which will be presented below. The research conducted by various researchers in Malaysia will also highlight the principles employed, such as Norman's Seven Principles and Mayer's 12 Multimedia Principles in Table I while Table II will provide a comparison of research conducted by researchers from other countries.

TABLE I. COMPARISON OF EXISTING GAMES FROM MALAYSIA

Research Paper	Details	Norman's Seven Principles	Mayer's 12 Multimedia Principles.
Understanding of Number Concepts and Number Operations Through Games in Early Mathematic Education	Focuses on 1 mathematics topic that follows the NPSC, which is comparing the numbers through a game.	1. Visibility 2. Consistency	1. Multimedia Principle 2. Temporal Contiguity 3. Pre-Training
Pedagogical Change in Mathematic Learning: Harnessing the Power of Digital Game-Based Learning	Focuses on grade 1 to 3 mathematics syllabus. Every lesson on the game is different from one another.	1. Visibility 2. Consistency 3. Constraint	1. Multimedia Principle 2. Temporal Contiguity
Learning Math Through Mobile Game for Primary School Students	A mathematics-based game that consist of all the syllabus in each of the grade.	1. Visibility 2. Signifier 3. Consistency 4. Constraint	1. Multimedia Principle 2. Modality 3. Pre-Training
Math Maze Zone – A study on The Implementation of Mathematical Game-Based Learning Tool for Primary School Students From Adult Perspective	A mathematics-based game that consist of few selected chapter/syllabuses	1. Visibility 2. Feedback 3. Affordance 4. Constraint 5. Consistency	1. Coherence Principle 2. Spatial Contiguity Principle 3. Segmenting Principle 4. Multimedia Principle

TABLE II. COMPARISON OF EXISTING GAMES FROM OTHER COUNTRIES

Research Paper	Details	Norman's Seven Principles	Mayer's 12 Multimedia Principles.
Serious Gaming: Environmental Impact Through Math	Focuses on advance mathematics that universities students are learning.	1. Visibility 2. Mapping 3. Consistency	1. Multimedia Principle 2. Pre-Training 3. Redundancy
Space Chain: A Math Game For Training Geometric And Arithmetic Progressions	Assisting teenagers/students in learning about arithmetic and geometric progression in a comfortable and enjoyable manner.	1. Visibility 2. Consistency 3. Mapping 4. Affordance	1. Multimedia Principle 2. Modality 3. Temporal Contiguity
Game Based Learning For Math Learning: Fractions Case Study	Developed for children aged 6 to 10 for teaching fractions, as well as its pedagogic motivation and two preliminary tests with users	1. Visibility 2. Signifier 3. Consistency 4. Feedback	1. Multimedia Principle 2. Modality 3. Segmenting 4. Signaling

III. METHODOLOGY

In this section, the experimental setup and game design in MMZ will be discussed.

A. Experimental Setup

In the game development process, the project can only move forward once all necessary experimental setup, including multimedia and graphic content, has been prepared. The Unity software platform will be utilized to build the application, with C# as the programming language used within Unity. The programming script will be created using Visual Basic software.

For the implementation process, all the planning should be done in action. Materials used in the project such as audio, video and 3D model should be developed properly. The system that has been developed should also be working properly. The application used to develop the project is by using Unity and Visual Basic software should also be downloaded to enable the application to be opened by using a computer. User should also be able to download the application through Google Store or other websites.

Other than that the scripting of the code for the game is working properly need to make sure. In this process, all programming script will be provided and the script will then need to be implemented in the game. Each scene needs to have script implemented in the game development. For each scene of the game, the script is used to instruct the game. For example, C# script is implemented in each of the button in order to help user to navigate to different scene. There is also a UI pop-out to shows what the user achieved after the user

completed a scene in the application. There will also be a script to allow user to play the video and audio in the application.

Next, in the user testing process, the application need to be tested each of its functionality. The user (which is the adults) who played the game will be conducting the user testing by playing the game and giving their feedback related to the game via the questionnaire and surveys in Google Form. This is the process that will help the developer to make some improvement to the game for it to be a better educational tool for the primary students.

Finally, in the evaluation process, the game will be evaluated based on the performance of the game itself whether it is functioning properly or if it is able to solve the problem statement. The game should also be able to achieve all the objectives and goals that have been set up earlier during the planning phase. Feedback will then be used to make some improvement to the game. If the final product does not meet up the expectation, revision will be needed, and the project will have to be re-analyzed so that a better game can be developed. Below is some of the information related to the development of the proposed game, which is the context diagram, use-case diagram, flowchart, storyboard, and the equipment. The gameplay of MMZ can be visualized through the flowchart presented in Fig. 2, as shown below.

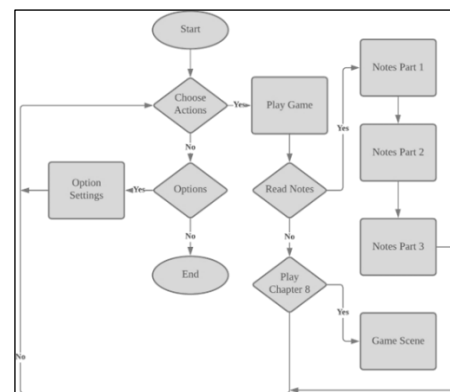


Fig. 2. Flowchart of the gameplay for MMZ

B. Game Design

In this section, the game elements, principle of human-computer interactions design and instructional design will be discussed.

1) Game elements

Genre: MMZ is a game that belongs to the maze genre, which involves navigating through a series of twists and turns to reach a specific goal. In this type of game, players are typically faced with a problem that they must solve to progress, such as finding the correct path through a maze or solving a puzzle. By requiring players to think critically and try different approaches until they find a solution, maze games can help learners develop their problem-solving skills and become more strategic thinkers. In the case of MMZ, the goal is for players to navigate through the maze and reach the end, while also solving math problems at each checkpoint along the way. By combining the elements of a maze game with math concepts,

MMZ provides an engaging and challenging way for learners to practice and reinforce their math skills.

Information: When players start MMZ, they are provided with some initial information that can help them as they progress through the game. This information includes notes and objectives, which are designed to give players an overview of the game and provide them with the tools they need to succeed. The notes, which can be accessed before the game begins, provide players with important information that can help them understand the concepts being covered and solve the questions they encounter along the way. The objectives, which are also listed in the game, give players a clear sense of what they need to accomplish and allow them to track their progress as they move through the maze. By providing players with this information at the start of the game, MMZ helps to set them up for success and encourages them to stay engaged and motivated as they play.

Game Objectives: MMZ is a game that is designed to help learners practice and reinforce their math skills, specifically in shape and space. The objective of the game is for players to navigate through a maze while searching for checkpoints, at which they will encounter questions that test their understanding of math concepts related to shape and space. As they progress through the maze, players will need to use their problem-solving and critical thinking skills to find the correct path to the end, while also looking for an exit from the maze. The inclusion of a chapter on shape and space in the game allows players to focus on a specific topic and deepen their understanding of that concept.

Quiz: MMZ includes a quiz feature that allows players to strengthen their knowledge of math concepts. At each checkpoint within the maze, players will be asked a series of questions that test their understanding of the topic being covered. If a player gets a question wrong, they will be given the opportunity to try again, allowing them to loop back and review the material as needed. This iterative process of practicing and reviewing can be an effective way for learners to reinforce their understanding of math concepts and improve their skills over time.

Game Mechanic: The game mechanic for MMZ involves searching and exploring a maze while also solving problems at each checkpoint within the maze. As players navigate through the twists and turns of the maze, they will need to use their problem-solving skills to find the correct path to the end. Along the way, they will encounter challenges and obstacles that require them to think critically and apply their math knowledge to proceed. This combination of exploration and problem-solving can be an engaging and challenging way for learners to practice and reinforce their math skills.

Feedback: MMZ is a game that is designed to help learners practice and reinforce their math skills. As players progress through the game, they will receive a score or grade that reflects their performance. This can be a useful way for learners to track their progress and understand their strengths and weaknesses. By receiving feedback on their performance, learners can identify areas where they need to improve and focus their efforts on practicing those skills. Additionally, seeing their scores improve over time can provide learners with

a sense of accomplishment and motivation to continue playing and learning.

2) *Principles of human-computer interaction design:* HCI is a very essential part in an application since it will enable the application to be more successful, safe, useful, and functional. In the long run, it will also make the user's experience more delightful. It is also important to have HCI involved in all stages of product or system development. MMZ also followed the human-computer interaction (HCI) [10][11] which based on Norman's Seven Principles [12][13]. Below are some of the principles that MMZ have applied in the development of the game.

- **Visibility:** Users should be able to tell what their options are and how to access them just by glancing at an interface. This is very important in mobile, web and a game application because making everything visible inside the limited screen space is difficult; therefore, only the options that are required should be included. For example, MMZ provided a very large environment scenery. This is to make sure that the user can see everything in the screen where there is nothing that is hidden from the user. They can also move the mouse around to see more of their surrounding environment.
- **Feedback:** After each action, the user must receive feedback to determine whether their activity was successful. For instance, change the tab's symbol to a spinning wheel to show that a webpage is loading. With the example provided, MMZ applied this in the each of the scene. Every time user entered a scene, the scene name will be listed in the middle top of the screen. This is to make sure that the user will know in what scene they are currently in. Other than that, there is also checkpoint's name listed on top of the checkpoint to help user to know how many checkpoints they have gone through.
- **Affordance:** The link between how things seem and how they're used is called affordability. It is also important for digital apps where the design should be simple enough that users can access the information, they want merely by looking at the interface. For example, MMZ provided an instruction at the very beginning of the game. This is to make sure that user can know what their objectives are before starting to play the game. Other than that, the button in the interface used a familiar design to make sure that user can recognize the button just through the design of the button itself.
- **Constraints:** Constraints is important to prevent a particular form of interaction between an interface and the user. In this example, since the game used the theme of maze, there will be lots of walls where user is unable to go through the wall. User will have to find their way out by finding the correct path to the end of the maze while finding checkpoints and solve the mathematical questions. Other than that, user will also be unable to continue exploring the maze if they did not get the 49-right answer during in the checkpoint scene. They need

to make sure that they get the right answer even if more time is needed to solve the questions. This is to make sure that user can perfectly understand the question and are able to get the right answer.

- Consistency: Learning new patterns is a process that can be used to improve one's abilities. It is also a requirement to avoid frustration when one does not get the same output from the same project. For example, MMZ has the same pattern when the game is going to be played which is that player need to explore the maze while solving the mathematical question provided in the checkpoint. They will return to the maze after solving the questions in the checkpoint scene. Other than that if the player answered the question wrongly, they would have to start all over from the start of the question again. This is to make sure that they are certain and remember the answer for each of the questions.

3) *Instructional design*: The construction of learning experiences and resources in such a way that knowledge and skills are acquired and applied is referred to as instructional design. MMZ also followed instructional design (ID) which based on Mayer's 12 Multimedia Principles [14][15][16].

- The Coherence Principle: Coherence Principle [17] states that humans learn the best when extra and distracting material is not included. For example, MMZ does not have any extra text in the main game scene. User will only have to focus on walking around the maze while answering the question in the checkpoint and finding their way out from the maze.
- The Spatial Contiguity Principle: The Spatial Contiguity Principle [18] refers to the physical distance between the text and visuals on the screen, claiming that relevant information and visuals are best learned when they are physically close together. For example, in the question scene in each of the checkpoint, there will be an image provided with the questions. This is to help the user to answer the questions while referring to the image.
- The Segmenting Principle: Humans learn best when information is delivered in segments rather than in one single continuous stream, according to the Segmenting Principle. Mayer discovered that when students have control over their learning pace, they perform better on memory exams. For example, there are notes provided in the game to help the user to answer the question if they are yet to do any revision. Other than that, students can also repeat themselves answering the questions many times if they have gotten the answer wrongly.
- The Multimedia Principle: According to the Multimedia Principle, humans learn better from words and pictures than from just words. This notion, that visuals plus words are more effective than words alone, is the bedrock of all Mayer's principles. This is the reason why MMZ was developed. It is to help the user to learn mathematics through the game which consists of images, scenery that turns into an educational game.

Instead of learning mathematics in the traditional way, they can make a revision by playing the game where they can repeat many times in answering the questions to help them to become more familiar with the topic.

IV. RESULTS

As the pandemic happening, school is unable to be open which lead us to unable to gain an experimental result directly from the student themselves. However, the targeted audience has been changed from primary school students to the public which are differentiated by age. This is because adults can give a better opinion about the game in. Also make sure that the participant is someone who have a very close relation with the student in primary school. This is to ensure that the feedback that the survey will get can be used to improve MMZ. For example, parent, students who have younger siblings in standard 6 etc. There are three age category which is below 20 years old, 20 to 25 years old and 25 years old above. This is to make sure that the results can get different opinion from people so that improvement can be made to MMZ. A survey has been conducted to gain data and analysis for the proposed game.

Through the survey, the survey has managed to gather 19 respondents who are willing to participate and review MMZ. 9 of the participants (47.4%) are at the age of 19 and below, 7 of them (36.8%) are at the age of between 20 and 25 and 3 of them (15.8%) are at the age of 26 and above. The survey is also divided into five sections in which each of them represent different part. Fig. 3 shown below is the age of the respondent.

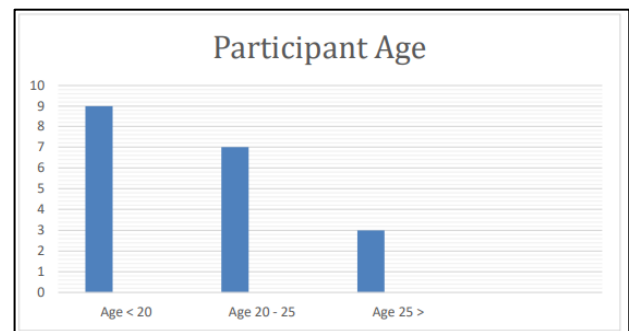


Fig. 3. Age of the respondents

The first section is about the usage of MMZ towards the learning comprehension. From the analysis gathered, 94.7% agreed that MMZ will be able to attract students to learn about mathematics. 89.5% agreed that students will be able to learn mathematics easily through the usage of MMZ. 94.7% agreed that MMZ are a suitable tool for student to do a revision. 94.7% agreed that students can gain more knowledge about mathematics through the usage of MMZ. 89.5% agreed that MMZ will be able to help students to increase their performance in learning mathematics.

The second section is about whether MMZ is a user-friendly application. 94.7% agreed that MMZ are very easy to be played with. 100% agreed that MMZ gameplay are easy to understand. 84.2% agreed that students will be able to learn with ease while playing with MMZ 100% agreed that students can learn while playing with MMZ. 94.7% agreed that students can play MMZ anywhere they want.

The third section is about the procedure of using MMZ. 94.7% agreed that the instruction given in MMZ is detailed and clear. 100% agreed that the language used in MMZ is easy to be understood 100% agreed that MMZ rules are easy to be followed. 100% agreed that MMZ achieved the level of comprehension for a student. 94.7% agreed that students can learn freely by using MMZ without needing a teacher's guidance.

The fourth section is about the usage of MMZ on student's creative and critical thinking. 100% agreed that MMZ can encourage students to think while answering the mathematical question. 100% agreed that MMZ can encourage students to make a discussion among their friends. 89.5% agreed that MMZ can encourage students to design a strategy to achieve success.

The fifth section is about the effectiveness of MMZ Here, the respondent gave an exact percentage of the marks that they can achieve while playing the game. 5.3% gained 40% marks, 36.8% can gain 60% marks, 36.8% are able to achieve 80% marks and 21.1% are able to achieve 100% marks. Overall percentage can see from Table III below.

TABLE III. OVERALL PERCENTAGE FROM THE FEEDBACK TAKEN

Category	Details	Results	
		Yes	No
Learning Comprehension	- Attract students to study	94.7%	5.3%
	- Easily understanding		
	- Reviewing learning	89.5%	10.5%
	- Gain knowledge	94.7%	5.3%
	- Improve learning's performance	94.7%	5.3%
User friendly	- Easy navigating	94.7%	5.3%
	- Easy to understand	100%	0%
	- Making it easier to study	84.2%	15.8%
	- Playing while Learning	100%	0%
	- Study anywhere	94.7%	5.3%
Procedure for MMZ	- Instructions given	94.7%	5.3%
	- Language easy to understand	100%	0%
	- Rules are easy to follow	100%	0%
	- Compatible to learn math	100%	0%
	- Learning independently	94.7%	5.3%
Creative and Critical Thinking	- Encourage to think	100%	0%
	- Encourage social interaction	100%	0%
	- Encourage planning	89.5%	10.5%
Effectiveness	- Learning Math through MMZ is effective		

V. DISCUSSION

In this section, potential future improvements that have been identified through the analysis will be discussed. The following enhancements can be made to MMZ:

- **Dual-language:** The game should consist of dual language due to the lack of knowledge in term of the languages from the participant. They had issues in understanding the mathematical questions due to not being able to comprehend the meaning of the question.
- **Scoring System:** There should be a scoring system to help the user to understand their level of knowledge instead of them trying to answer the questions multiple times to get the correct answers.
- **More Challenges:** There should be more challenges provided in the game such as number of lives, enemies and traps provided in the game to make the game more challenging and fun to be played instead of them just wandering around the maze.
- **Voice-Over:** There should be a voice-over for each of the question in the checkpoint to help the user to be able to comprehend and understand the question better.
- **Answer Walkthrough:** There should be an answer walkthrough provided for the users who are unable to answer the questions correctly.
- **More Difficulty Level:** There should be more difficulty level according to the age of the students so that more students are able to use MMZ to help them learning mathematics much easier.

VI. CONCLUSION

MMZ is a comprehensive and interactive educational game that has been specifically designed to assist standard six students in overcoming their difficulties and challenges in learning math subjects. By providing a fun and engaging way to practice and reinforce essential math concepts and skills, this game aims to enhance the students' confidence, motivation, and performance in math, and to support their overall academic success and growth. MMZ also implemented principle of HCI to make sure that the game can improve the ways in which people interact with computers and other digital devices. Instructional designs are also implemented to create effective, efficient, and engaging learning materials and experiences that support the learners' acquisition and retention of knowledge, skills, and attitudes.

The survey results provided valuable feedback about the game, and there are several suggestions for improvement that will make the game more effective as a learning tool for a wider audience. These suggestions include adding a dual language option, a scoring system, more challenges, voice-over, step-by-step explanations of answers, and different difficulty levels. By implementing the recommended suggestions, MMZ has the potential to not only become a more effective educational tool for primary school students, but also for students of other grade levels. While the UPSR exams had been dissolved, standard six students still have a final entrance

exam that will determine their academic standing and help them choose a suitable high school.

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