



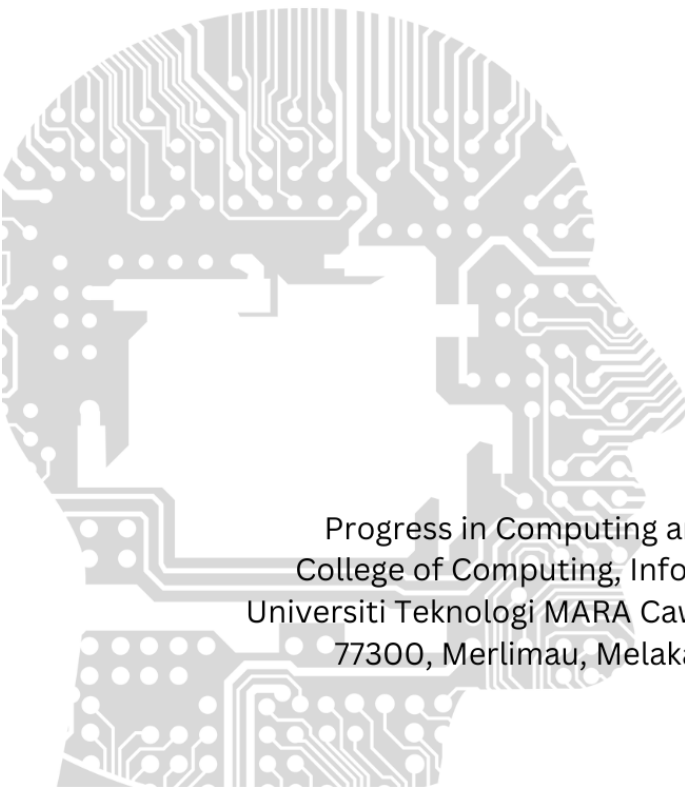
Cawangan Melaka

PCMJ

Progress in Computing and Mathematics Journal

volume 1

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Progress in Computing and Mathematics Journal
College of Computing, Informatics, and Mathematics
Universiti Teknologi MARA Cawangan Melaka, Kampus Jasin
77300, Merlimau, Melaka Bandaraya Bersejarah

PCMJ

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volume 1



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PCMJ

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PREFACE

Welcome to the inaugural volume of the **Progress in Computing and Mathematics Journal (PCMJ)**, a publication proudly presented by the College of Computing, Informatics, and Mathematics at UiTM Cawangan Melaka.

This journal represents a significant step in our commitment to fostering a vibrant research culture, initially providing a crucial platform for our undergraduate students to showcase their intellectual curiosity, dedication to scholarly pursuit, and potential to contribute to the broader academic discourse in the fields of computing and mathematics. However, we envision PCMJ evolving into a beacon for researchers both nationally and internationally. We aspire to cultivate a space where groundbreaking research and innovative ideas converge, fostering collaboration and intellectual exchange among established scholars and emerging talents alike.

The manuscripts featured in this first volume, predominantly authored by our undergraduate students, are a testament to the hard work and dedication of these budding researchers, as well as the guidance and support provided by their faculty mentors. They cover a diverse range of topics, reflecting the breadth and depth of research interests within our college, and set the stage for the high-quality scholarship we aim to attract in future volumes.

As editors, we are honored to have played a role in bringing this journal to fruition. We extend our sincere gratitude to all the authors, reviewers, and members of the editorial board for their invaluable contributions. We also acknowledge the unwavering support of the college administration in making this initiative possible.

We hope that PCMJ will inspire future generations of students and researchers to embrace research and innovation, to push the boundaries of knowledge, and to make their mark on the world of computing and mathematics.

Editors

Progress in Computing and Mathematics Journal (PCMJ)
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LEARNING ABOUT MALAYSIA THROUGH GAME

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Article Info

Abstract

Malaysia is a Southeast Asian country located on the Malay Peninsula and the island of Borneo. Malaysia is a multicultural nation with, without a doubt, a rich cultural heritage with Bahasa Malaysia as the main language used. However, the declining knowledge of Malaysians raises concerns. This study addresses the lack of appreciation for Malaysia by developing a 2D game, aiming to evaluate the effectiveness of the game. The Agile methodology employed in the development of the game allows for continuous feedback and improvement, ensuring that the content remains relevant and up-to-date. The effectiveness evaluation testing will use a pre-survey and post-survey questionnaire to evaluate the effectiveness of the game. The findings suggest that the game is effective with an average mean of 4.2. As the project progresses, future iterations of the game can incorporate updates, and feedback from users, ensuring its continued relevance and effectiveness as an educational tool.

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Keywords: Malaysia; 2D game; Effectiveness Evaluation

INTRODUCTION

Malaysia, located in Southeast Asia on the Malay Peninsula and Borneo, is a diverse and culturally rich nation with Bahasa Malaysia as its main language. Its cuisine reflects a mix of cultures and religions, featuring popular dishes like nasi lemak and satay. Unfortunately, the value of Malaysians, including the youth, is declining, and there's a lack of knowledge about the country (Zamri Mahamod et al., 2021).

To address this issue, digital games have proven effective in generating interest and imparting knowledge about Malaysia's culture and history. This approach, using computers and gadgets, enhances engagement, problem-solving skills, social development, and academic abilities (Yahaya & ChePa, 2018). Game-based learning is believed to simplify the learning process, create an enjoyable atmosphere, and increase knowledge retention elements (Al-Fatta et al., 2019).

Problem Statement

Lack of appreciation about Malaysia's traditional arts and crafts amongst the public

According to a study by Izani et al. (2020), the majority of Malaysians showed a lack of admiration for a traditional dance originating from Kelantan. The hindrance to the appreciation of such traditions is attributed to the inherent divergence between regional cultures and traditions, making them incompatible with societal acceptance. These disparities between traditional practices and societal norms act as barriers to the broad acceptance of these cultural forms.

Lack of multicultural knowledge about Malaysia among youngsters

The worrying issue is the public's limited multicultural understanding of Malaysia. This knowledge gap not only obstructs successful cross-cultural communication and social integration but also poses challenges to the promotion and preservation of Malaysia's cultural heritage. A significant proportion of Malaysians tend to form friendships mainly within their own ethnic group. Power imbalances arising from differences in race, ethnicity, gender, religion, and socio-economic status within close-knit communities can create divisions among individuals from different groups. Factors contributing to this include personal choices, religion, language, and cultural disparities (Lino & Hashim, 2020).

Project Objectives

1. To design an application of Learning About Malaysia Through Game.
2. To develop an application of Learning About Malaysia Through Game.
3. To evaluate the effectiveness of Learning About Malaysia Through Game.

Project Scope

The project aimed to educate individuals, including locals, about Malaysia through a 2D computer game in English, falling under the Puzzle and Educational genres. The game incorporated multimedia elements and focused on Malaysian culture, states, history, and cuisines. Users could choose themes, such as states, and had to guess answers to progress in

the game. The implementation used Unity for graphics, animation, logic, user interface, and sound effects.

Project Significance

This project's significance lies in delivering an effective educational game to motivate users and enhance information retention through a combination of education and entertainment. Despite Malaysia's rich cultural and historical diversity, there is a general lack of appreciation among the public, particularly regarding regional cultures. Youngsters also lack multicultural knowledge, hindering their ability to socialize across racial backgrounds. The word-guessing game format not only promotes critical thinking and problem-solving skills but also serves as a means to address these knowledge gaps. The project is crucial as it underscores the importance of educational games in fostering appreciation for Malaysia's culture and increasing multicultural knowledge while providing an enjoyable gaming experience.

LITERATURE REVIEW

Malaysia is a Southeast Asian country located on the Malay Peninsula and the island of Borneo. It has fourteen states, traditional cuisines, cultures, and historical legends shaping Malaysia into a diverse and independent country.

Game-Based Learning

The project was made into a game-based learning video game where it combined two genres, puzzle and educational. The benefits of game-based learning include enhancing motivation (Hussein et al., 2019), and strengthening problem-solving skills (Anastasiadis et al., 2018).

Implementation of Digital Educational Model Canvas

The project used Digital Educational Game Model Canvas (DEGMC) as the framework to gain comprehensive understanding of the game's design (Damkham et al., 2021). One of the objectives of this project stated to evaluate the effectiveness of the game. The study also includes Digital Educational Game Form (DEGF), but this project would only use the DEGMC.

Game Target Group	Learning Outcome	Game Name	Learning Assessment	Game Factor Measurement
Learning Topic		Gameplay		
Type of Game			Game Tutorial & Content	Extra Component
Player Experience				
Appearance & Emotion of Game	Game Platform & Controller			
	Storyboarding & Character Design	Game Flow Design		

Figure 1: Digital Educational Game Model Canvas

Component of DEGMC and DEGF		DEGMC	DEGF
Introductory data in designing a game	Game Name	✓	✓
	Game Target Group	✓	✓
	Type of Game	✓	✓
	Player Experience	✓	✓
	Appearance and Emotion & of Game	✓	✓
	Game Platform & Controller	✓	✓
	How to create games	X	✓
Storytelling and character design	Storytelling	✓	✓
	Fantasy	Not required	✓
	Narrative	Not required	✓
	Mystery	Not required	✓
	Climax	Not required	✓
	Storyline	X	✓
	Character	✓	✓
Learning design	Learning Topic	✓	✓
	Learning Outcomes	✓	✓
	Game Goal	✓	✓
	How to play	✓	✓
	Technical for Playing	X	✓
	Learning Assessment	✓	✓
	Game Factor Measurement	✓	✓
	How to teach player	✓	✓
	How to suggest player	✓	✓
	How to adjust game's level suitable for player	✓	✓
	Learning Assessment Table	X	✓
Game flow design		✓	✓
Extra component	Side Quest	Not required	✓
	Socializing	Not required	✓
	Badge	Not required	✓
	Avatar	Not required	✓
	Collection	Not required	✓

Figure 2: The component of DEGMC and DEGF

Effectiveness Testing

To evaluate the effectiveness, a pre-survey will be given to participants before playing the game. After playing the game, a post-survey will be given to participants (Kazar & Comu, 2021). The two surveys used the same questions.

Cultural Games

Cultural games have had a long-standing presence in the gaming industry which includes PC-based or mobile applications. Cultural heritage is frequently viewed as a means of transmitting knowledge, values, and beliefs from one generation to another (López-Fernández et al., 2021).

In recent years, there has been an increase in the creation of games centered around cultural heritage (Camuñas-García et al., 2023). They promote cross-cultural understanding, preserve cultural heritage, enhance education, and contribute to the enrichment of the gaming and entertainment industry.

Impact on Users

This game genre is gaining popularity, drawing greater attention from educators aiming to leverage digital game-based learning for cultural heritage instruction. Well-designed games have the capacity to foster targeted skills, enhance content delivery, and provide a unique learning experience beyond real-world encounters (Garcia-Fernandez & Medeiros, 2019).

Review of Methodologies

By comparing and evaluating various methodologies, the aim of this review is to provide insights that can guide in selecting the most suitable approach for a specific project requirement. The review was focused on methodologies such as Waterfall, Agile, and Rapid Application Development (RAD), considering their key principles, benefits, limitations, and real-world implementation experiences. Understanding the nuances of each methodology contributed to effective project planning, execution, and successful project outcomes.

Waterfall Model

The Waterfall model is a linear, sequential approach to the Software Development Lifecycle (SDLC) that is commonly used in software engineering and product development. As the name implies, a Waterfall model has phases that move downwards. Each of these phases are required to be completed before moving on to the next phase.

The primary benefit of the waterfall model lies in its capacity to establish a framework for arranging and managing a software development project (Aroral, 2021). This method

emphasizes careful planning and documentation, enabling the programmer to anticipate and address these specific challenges at each stage of the project.

Despite the advantages, the most prominent issue encountered by the Waterfall method is its incapability to adapt to change effectively. Reverting to a previous step or transitioning between them becomes highly challenging when problems emerge. (Trivedi, 2021).

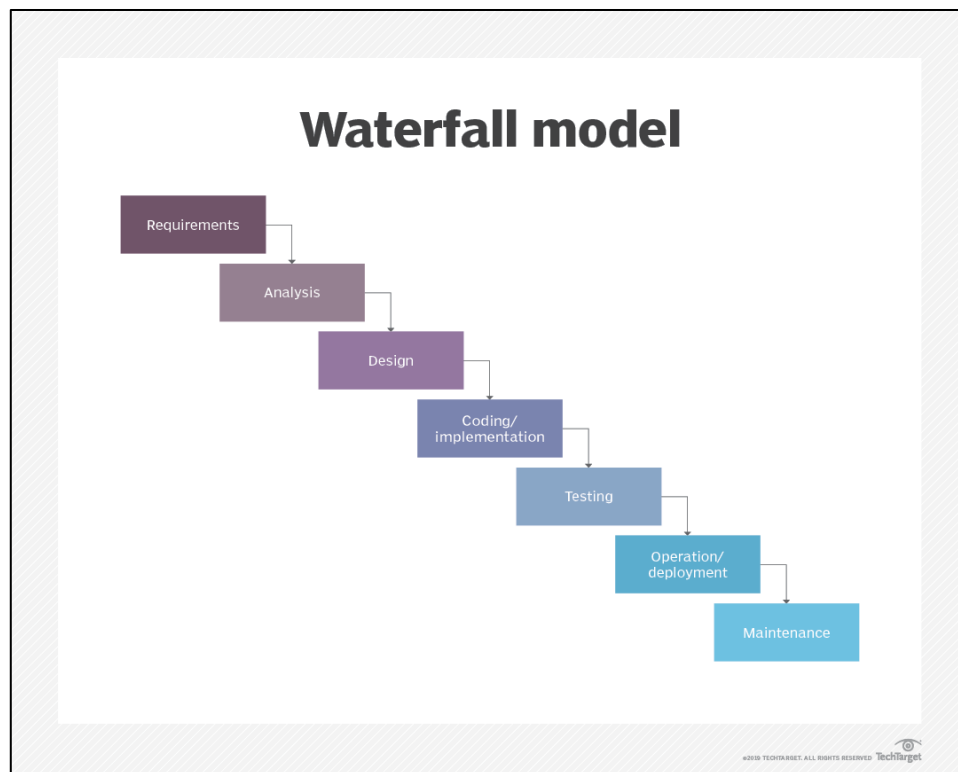


Figure 3: Waterfall Model

Agile Model

The Agile model is an iterative and incremental approach to software development. It emphasizes flexibility, adaptability, collaboration, and continuous improvement. It is much faster than the waterfall mode, hence the name “Agile”.

Compared to the waterfall model, Agile model demonstrates a higher level of adaptability when it comes to accommodating requested changes, so it makes it easier to have direct communication between the developer and the client. Agile model is also particularly efficient and well-suited for small and medium-sized projects (Al-Saqqa et al., 2020).

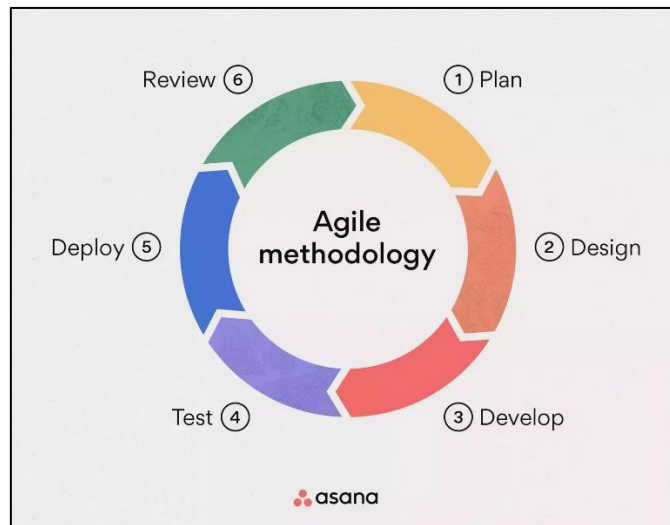


Figure 4: Agile Model

Rapid Application Development (RAD)

Rapid Application Development (RAD) is a software development methodology that focuses on expedited application development through iterative prototyping and close collaboration between developers and end-users.

RAD is a software development lifecycle that enables faster development and delivers high-quality software compared to traditional methods. It assists organizations in accelerating software development, reducing development costs, and ensuring software quality. RAD is a process that speeds up the prototyping and minimizes the emphasis on extensive planning. The primary goal of RAD implementation is to expedite the software development timeline and generate superior-quality products (Fauzi et al., 2023).

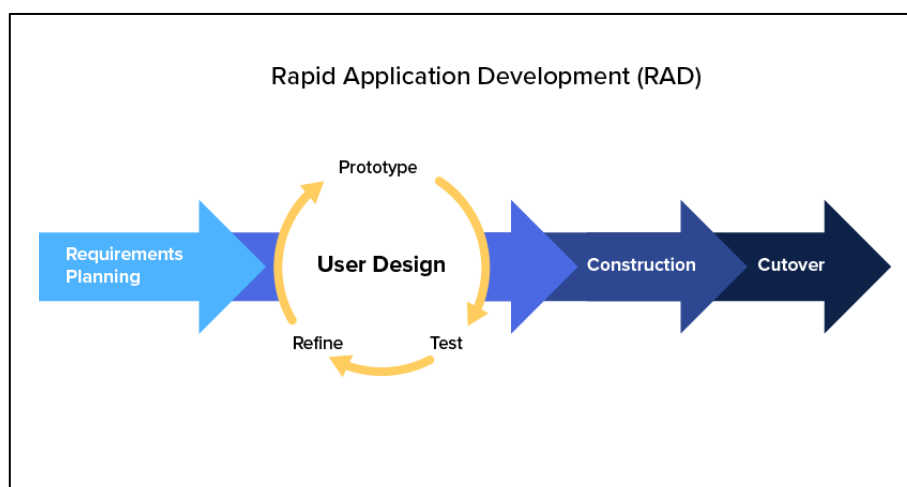


Figure 5: Rapid Application Development (RAD)

Comparison Between Methodologies

To choose the best approach for a task, it's vital to compare methodologies, each with its strengths and weaknesses. The Waterfall model, though easy to understand, may face setbacks if issues arise. Agile, a quick and flexible model, suits projects with short timeframes, but frequent updates can be challenging. RAD, a subset of Agile, emphasizes rapid prototyping but depends on user input. After careful consideration, Agile is deemed most suitable for this project with a tight timeframe, requiring efficient time management to meet objectives.

METHODOLOGY

Agile methodology is a modern approach to project management and software development. Agile methodology promotes an iterative and collaborative approach, aiming to minimize resource wastage, development time, and effort (Salza et al., 2019). The Agile methodology was chosen solely for this project due to its speed and the requirements are clear and easy to understand. The Agile methodology provides developers with an opportunity to closely monitor their software development process according to customer requirements, particularly when the project is of a smaller scale.

There are six phases in Agile methodology. Plan, design, develop, test, deploy, and review. Each of these phases follows a unique flow and process that ensures smooth development of projects.

Planning phase

The first phase in Agile development is the planning phase. This phase is the starting phase needed to plan out information and gather data to start the project. First, conducting a research analysis is crucial to gather relevant information and insights.

Design Phase

During the design phase, the developer's main task is to create a well-structured flow for the software from start to finish. To achieve this, it is essential to sketch a flowchart and storyboard as a blueprint before proceeding with further development.

Development Phase

Next phase is the development phase. During this phase, the software developer creates the software by utilizing the requirements and design specifications established in the earlier phases. The main focus in this phase is to develop the game's scripting and design all the game mechanics.

Testing Phase

The testing phase is an integral part of the development process and occurs continuously throughout the project's lifecycle. Agile emphasizes early and frequent testing to ensure quality and address issues promptly. During the testing phase in Agile, the development team focuses on various types of testing to validate the functionality, performance, and usability of the software.

Deploy Phase

The deploy phase is the final stage of the development process where the software or application is prepared for release and made available to users. This phase involves activities related to deployment, installation, and making the software operational in the production environment. Should any changes be required, the developer was to immediately act on it based on the client's needs.

Review Phase

The review phase is the final phase in agile methodology. The review phase is a crucial step in the development process where the completed work is evaluated, assessed, and reviewed to ensure that it meets the desired quality and aligns with the project requirements.

RESULT AND DISCUSSION

One of the project's objectives includes evaluating the game's effectiveness. This means delivering the game to other people for them to test and give feedback on the game. To conduct the evaluation, two Google Forms were created, one is pre-survey, and one is post-survey. The pre-survey was given to participants to give their feedback before playing the game. The post-

survey was given after the participants played the game. A total of 30 participants participated in the testing phase of the project.

Overall Findings

After completing the game, participants were to provide feedback via a Google Form. The form encompassed questions relating to Malaysia in general, each linked to its own set of values. Then, the results will be tallied up based on this formula:

$$\text{Mean} = (\text{Sum of questions} * \text{Scale}) / 30$$

1

Each answer from the post-survey will be tallied up and turned into mean. The following is the table for post-survey results.

Table 1: The calculation of average mean from post-survey results

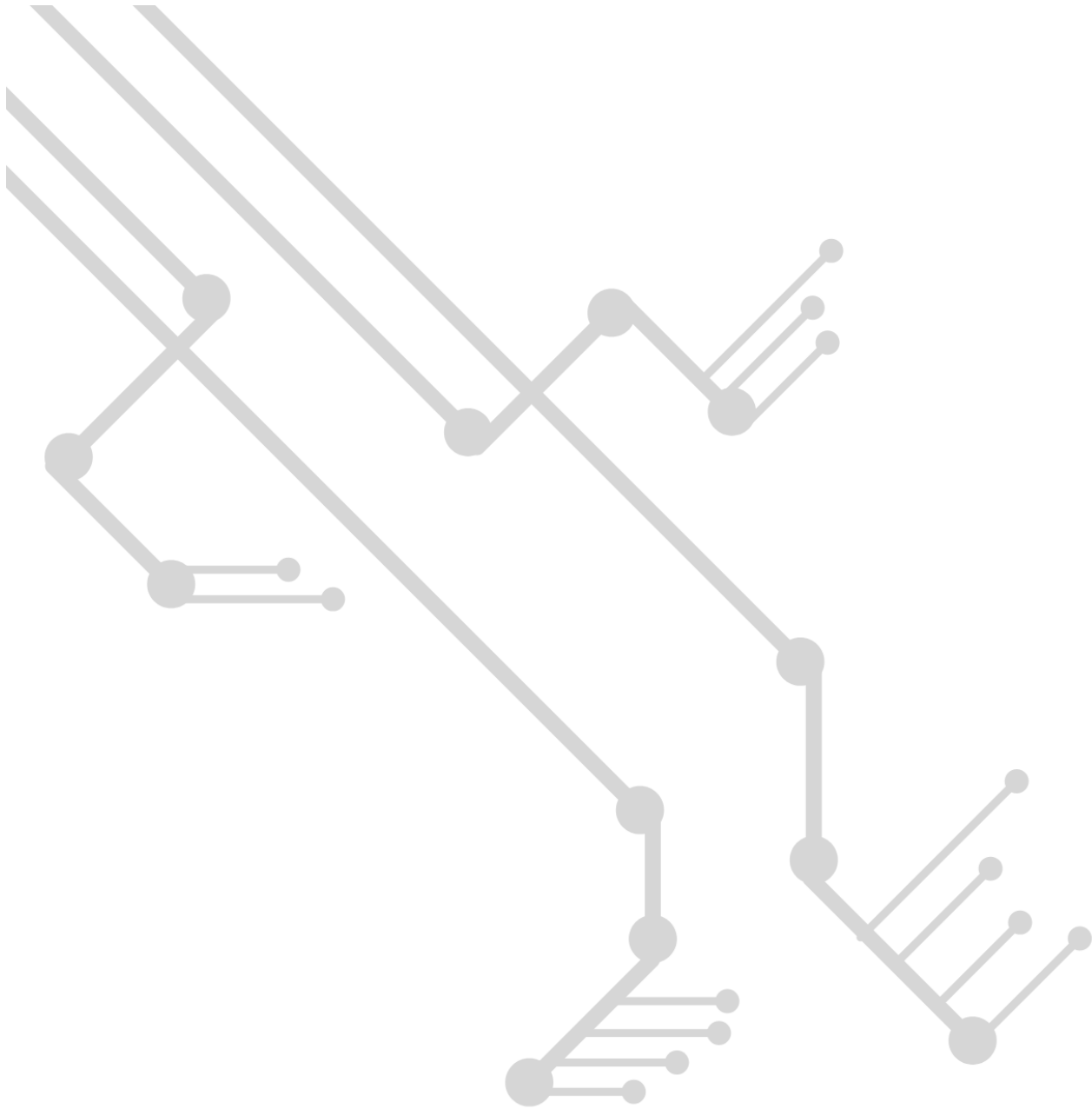
Questions	1	2	3	4	5	Mean
1	0	0	2	18	10	4.27
2	0	0	3	18	9	4.2
3	0	0	2	19	9	4.23
4	0	0	2	22	6	4.13
5	0	0	5	18	7	4.07
6	0	0	7	14	9	4.07
7	0	0	4	18	8	4.13
8	0	0	1	20	9	4.27
9	0	0	1	15	14	4.43
10	0	0	4	17	9	4.17
Total Average Mean:						4.2

The final result shows that the average mean is 4.2. This indicates that on a scale of 5, the total average mean has shown a positive impact on the respondents. Therefore, it has been proven that this project has successfully achieved the third objective which is evaluating the game's effectiveness.

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