



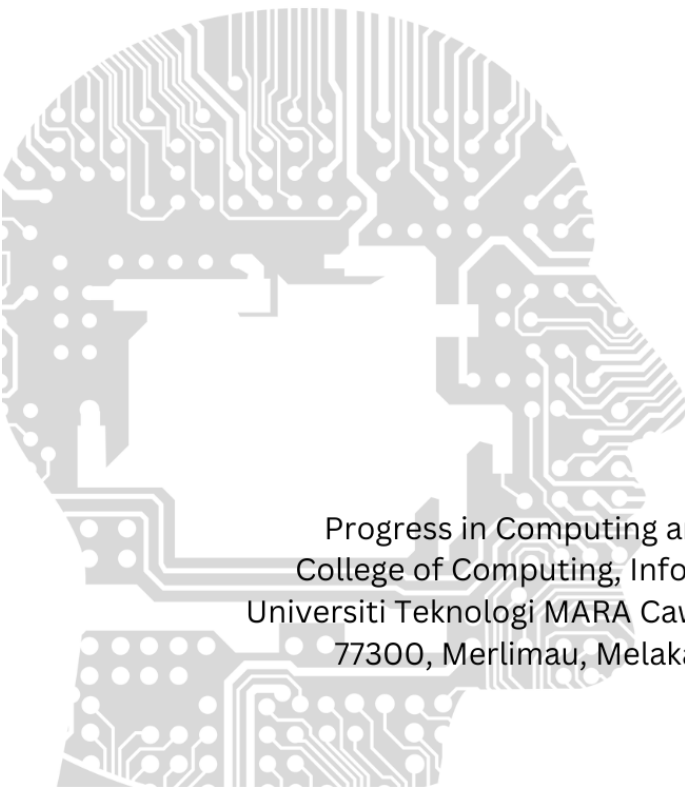
Cawangan Melaka

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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PCMJ

Progress in Computing and Mathematics Journal

volume 1

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)
College of Computing, Informatics, and Mathematics
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MENTALCARE: GAME-BASED LEARNING ON MENTAL HEALTH AWARENESS

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Article Info

Abstract

Mental health awareness is important to understanding and supporting individuals with a range of mental health conditions. According to previous studies and preliminary studies that have been done, most people lack awareness of mental health. People often ignore mental health problems due to lack of exposure and the information available online is too boring for them to read every single one. Therefore, this project has developed MentalCare: Game-Based learning on mental health awareness. The objectives of this project are, 1) to design a storyboard about the importance of mindfulness in maintaining mental health, 2) to develop a 2D video game with a game-based learning concept to raise awareness about mental health care among the Malaysian community, 3) to evaluate the user enjoyment on the developed game-based learning application. The game was implemented Agile as a project methodology. The evaluation scale adapted is based on EGameFlow Model which consist of five dimensions: Concentration, Goal Clarity, Feedback, Immersion and Knowledge Improvement. The project findings indicated that the user agreed they had experience about 80% of element enjoyment in this game.

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Keywords: Game-Based Learning; Mental Health Awareness; Agile Methodology

BACKGROUND OF STUDY

Mental health awareness involves understanding various mental health conditions and their impact on individuals and society. It emphasizes the importance of mental well-being for overall health and functioning. Good mental health enables coping with life's stresses and forming healthy relationships, while poor mental health can lead to negative outcomes like

decreased productivity and impaired social functioning. Addressing stigma and promoting mental health literacy are crucial to encourage seeking help and providing adequate treatment.

Various technologies and digital tools, such as mobile apps, online platforms, health websites, and social media, are utilized to raise awareness about mental health and support individuals in maintaining their mental well-being. These tools provide resources, information, and campaigns to promote mental health and educate the public about mental health issues.

A project has been developed to spread awareness about mental health through a 2D video game. Users select a mental health issue and guide a character to see a doctor for more information. The game aims to be user-friendly and educative, promoting understanding and awareness of the importance of mental health care.

LITERATURE REVIEW (HEADING 1)

The relationship between mental health and physical health can increase mutual risks, with mental well-being influenced by various factors over time (Gamm, 2010). Anxiety and depression, characterized by excessive concerns and enduring sadness respectively, are common mental health issues influenced by underlying causes (Radzniwan & Ahmad, 2023). They often present with physical manifestations and affect sleep, appetite, and energy levels (Henriksson et al., 2022). Prioritizing mental health and seeking treatment when necessary is crucial, with various professionals offering help such as counsellors and psychologists. Treatment methods vary based on individual needs and may include therapy, medication, lifestyle changes, and support from loved ones. Mental health issues are common and should not be overlooked. Efforts to raise awareness and educate the public, including through projects like this one, are essential.

Definition of Mental Health

Mental health encompasses a person's emotional, psychological, and social well-being, affecting how they think, feel, behave, and handle stress (Galderisi et al., 2017). It involves positive factors like resilience and self-esteem and is crucial for effective functioning and fulfilling relationships (Fusar-Poli et al., 2020). Depression and anxiety are prevalent mental disorders globally, often stemming from factors like work pressure and environmental conditions (Min Fui et al., 2022). They significantly impact daily life (Valkenburg et al., 2022).

Mental health conditions are prevalent in Malaysia, with approximately one in three Malaysians experiencing them during their lifetime, often triggered by work tension or unstable mood disorders (Hassan et al., 2018). Anxiety is described as a response to various internal and external factors affecting thoughts, feelings, and environment. Overall, mental health encompasses emotional, psychological, and social well-being, impacting how individuals think, feel, and behave. It involves positive factors like resilience and self-esteem and is vital for effective functioning and fulfilling relationships. Depression and anxiety are common worldwide, influenced by stress, environmental factors, and mood disorders. Stress is dynamic and affects physical, emotional, and cognitive processes (Isha et al., 2023).

The Importance of Awareness in Maintaining Mental Health

The importance of mental health awareness stems from its significant impact on everyday life, affecting individuals regardless of age, gender, ethnicity, or social class. Approximately 792 million people, or 10.7% of the global population, experience mental health disorders, highlighting the widespread prevalence of such issues (Lee et al., 2023).

Ignorance about mental health challenges, social stigma, and traditional beliefs contribute to the persistence of mental health problems, leading to devastating effects on individuals, families, organizations, and society. Many individuals underestimate mental health issues and believe they will resolve on their own without professional intervention. Hence, this project was developed to raise awareness and educate people about the importance of mental health care, using digital games as an engaging medium (Kyumana, 2022).

Game-Based Learning

Game-based learning integrates games or game-like tasks into education to enhance learning and engage students. It involves incorporating game components, mechanics, and concepts to increase interactivity and enjoyment while promoting cognitive and perceptual skills (Khorammakan et al., 2023). Digital games are seen as effective tools for learning and motivation, with organizations using them to increase engagement. Optimizing game-based learning by considering primary objectives, cross-cutting objectives, selecting game mechanics, and evaluating effectiveness (Chang & Yang, 2023).

To develop an effective game-based learning program, creators should begin by establishing clear objectives for the program. They should then select a topic of interest to

engage the target audience and choose appropriate game mechanics that align with the objectives. Lastly, a thorough evaluation of the program's effectiveness in terms of enjoyment, quality, and user satisfaction is essential (Chang & Yang, 2023).

Definition of Game-Based Learning on Mental Health Awareness

The video game employs game-based learning to engage players and provide them with information and awareness about mental health. Research indicates that games have a moderate to strong effect on improving learning outcomes, including cognitive and interpersonal skills, compared to non-game conditions. However, the abundance of data generated from player interactions with the game may pose challenges for educators and learners in processing and deriving insights about learners (Kim et al., 2022).

Video games are universally enjoyable, making them an effective tool for educating the public about mental health awareness. This project utilizes game-based learning to create a video game for this purpose. The importance of systematizing the process of game-based learning using standards and game-independent analyses and visualizations. Various techniques can be applied to derive meaningful information to better understand learner actions and results in serious games (Alonso-Fernández et al., 2022).

The Benefits of Game-Based Learning for Mental Health Awareness

The objective of this project is to develop an engaging video game serving as an educational tool for the Malaysian community, aimed at enhancing their understanding of mental health care. By increasing awareness of the importance of mental health maintenance, the game seeks to empower users to take preventive measures early on. Leveraging game-based learning, the project aims to effectively raise awareness, drawing parallels with the proven effectiveness of game-based interventions in promoting physical activity, as evidenced by various studies (Kim et al., 2022).

Game-Based Learning has been shown to enhance student motivation across various subjects, including mental health awareness. Immersion in game-based environments leads to increased internal motivation and decreased reliance on external motivation among students. This effect is attributed to incentivized structures within games, such as point systems and rewards, which effectively engage and motivate players to pursue learning objectives actively.

The widespread adoption of gamification techniques has improved educational outcomes, including performance and motivation (Li et al., 2023).

Game-Based Learning has been found to enhance users' problem-solving abilities, which are crucial for maintaining mental well-being and preventing internet addiction. Engaging in strategic games helps develop critical thinking and decision-making skills, applicable in practical scenarios. Implementation of gamification techniques in higher education simplifies challenging tasks, leading to efficient performance in difficult subjects. Overall, game-based learning offers numerous benefits for educating people about the importance of mental health maintenance (Li et al., 2023).

Technology Implementation

To ensure successful learning outcomes, creating educational experiences through game-based learning involves a methodical approach. A model consisting of several phases covering the game-based learning process: need analysis, design concept, learning design, game prototyping, game development, iterative testing and feedback, deployment and integration, evaluation and assessment, and maintenance and update (Zhao et al., 2021).

Need Analysis

Start by conducting a thorough assessment to identify the learning goals, target audience, and specific skills or knowledge the game should address. Ensure a clear understanding of the educational objectives and align them with the game's design.

Design Concept

Based on the findings from the needs analysis, develop a design concept that outlines the fundamental concept of the game, its gameplay mechanics, and integration of learning objectives. Consider factors like the game genre, target platform, art style, and user experience to ensure the effectiveness of the educational content.

Learning Design

Create a detailed learning design plan that links learning objectives with game mechanics, challenges, and assessments. Define instructional strategies, content delivery methods, and assessment approaches to be used in the game.

Game prototyping

Develop a prototype of the game to assess its viability and collect feedback. The prototype should showcase basic gameplay mechanics, visual aesthetics, and initial content. Evaluate the prototype by presenting it to a representative audience for input and insights, identifying areas for improvement.

Game Development

Once the prototype is validated, proceed with comprehensive game development tasks such as coding, asset creation, level design, and user interface development. Choose appropriate game development tools and platforms based on the target audience and deployment requirements.

Iterative Testing and Feedback

Continuously test the game and gather feedback from students and the public. Integrate their suggestions to improve game mechanics, content, and user experience. Use this feedback to refine and enhance the game throughout its development.

Deployment and Integration

After completing development and testing, deploy the game on the designated platform(s) (desktop, mobile, or web-based). Ensure smooth integration with any required learning management systems or educational platforms, if applicable.

Evaluation and Assessment

Assess the effectiveness of game-based learning by evaluating user engagement, sensitivity, and achievement of learning objectives. Use qualitative and quantitative measures like surveys, quizzes, and analytics to gather data and ensure the game achieves its goal of promoting mental health awareness.

Maintenance and Updates

Continuously monitor game performance and make updates based on user feedback and evolving awareness of mental health. Regularly maintain the game to ensure compatibility with new technologies and platforms.

METHODOLOGY

Agile Methodology

The Agile methodology in software development emphasizes iterative and incremental approaches, derived from the concept of "moving quickly." It was created to handle changes more easily during the design process, maximizing resources and time by efficiently managing and accommodating modifications. This contrasts with other methodologies that may make developers' efforts futile when faced with changes (Murugaiyan & Balaji, 2012).

Agile methodology was chosen for this project because it offers a straightforward process essential for designing a successful video game. It helps align development with customer requirements, especially for smaller projects. With complex storytelling elements related to mental health and intricate gaming features, there's a high chance of deviating from the original plan. Agile's efficient management of changes during design saves time and resources, making problem-solving easier.

Insufficient planning in software development can lead to underestimating the time needed to meet requirements. Agile methodology helps address this challenge by minimizing the time required to complete the software (Edeki, 2015).



Figure 3: Agile Methodology Model

RESULT AND DISCUSSION

The goal of the game is to assess if the project has successfully met its third objective of ensuring user enjoyment during gameplay. The EgameFlow Model will be employed to gauge various elements such as concentration, goal clarity, feedback, knowledge improvement, and immersion, serving as benchmarks for comparison. Certain elements not deemed suitable for the game's educational focus will be excluded from consideration.

Instrument

In this project, a survey is employed to gauge the satisfaction of testers, offering an effective and cost-efficient means of collecting substantial information. The assessment utilizes the EGameFlow paradigm, originally comprising eight criteria: concentration, goal clarity, feedback, challenge, control, immersion, social interaction, and knowledge improvement. However, due to reasons unrelated to the game, challenge, control, and social interaction have been excluded from the evaluation. Each criterion in the questionnaire consists of five components, with multiple questions in each section aimed at assessing specific aspects. The total number of items across all criteria is twelve, as outlined in Table 1 Each criterion will be rated from strong to weak.

Table 1: EGameFlow Model Immersion

Factor	Item No.	Contents
Concentration	C1	The game grabs my attention
	C2	The game provide content that stimulates my attention
Goal Clarity	G1	Overall goals were presented clearly
	G2	I understand the learning goals through the game
Feedback	F1	I receive feedback on my progress in the game
	F2	I am notified with new task immediately
Immersion	I1	I forgot about time while playing the game
	I2	I become involved in the game
	I3	I become unaware of my surrounding while playing the game
Knowledge Improvement	K1	The game increases my knowledge
	K2	I catch the basic idea of the knowledge taught
	K3	I want to know more about the knowledge taught

Findings

Based on the questionnaire's results, most participants are in the age group of 18-28 years old (n=20, 80%) followed by the age group of 12-17 (n=5, 20%). Most of the participants are female (n=14, 56%) and followed by male (n=11, 44%). Table 1 shows the demographic of the participants retrieved from the evaluation summary.

Table 2: Demography of MentalCare Evaluation Participant

Category	Range	Frequency	Percentage
Gender	Male	11	44%
	Female	14	56%
Age	12-17	5	20%

18-28	20	80%
29 and above	0	0%

Concentration

In the context of the model, concentration immersion refers to the game's requirement to offer activities that enhance a player's focus while avoiding excessive learning stress that could potentially diminish their concentration. As depicted in Table 3, 52% of participants agree that game activities have the capacity to captivate them. This outcome is attributed to the game's positive impact on the player's learning tasks. For instance, activities like collecting coins to consult with Dr. Borhan for mental health information. Respondents agree that this game provides content that stimulates their attention with 56%. This shows that the information provided can attract interest and is easy to understand.

Table 3: Result on Concentration

Concentration	SD	D	SA	A	SA	Mean
C1	0	0	8	13	4	3.84
C2	1	0	3	14	7	4.04

*SD -Strongly Disagree, D -Disagree, SA -Slightly Agree, A -Agree, SA -Strongly Agree

Goal Clarity

As indicated by Table 4, most participants, comprising 44%, mostly agree that the overall game goals were clearly presented. Additionally, 40% of participants express strongly agree with the clarity of the game's goals and objectives. It can be concluded that the game effectively communicates its goals to the players. There is a clear understanding the learning goals through the game. Many respondents, totalling 44%, agreed with this notion. Additionally, 32% of respondents strongly agree, indicating that the game successfully achieves its primary objective of facilitating learning through gameplay. This demonstrates the effectiveness of the game in combining entertainment with educational elements.

Table 4: Result on Goal Clarity

Goal Clarity	SD	D	SA	A	SA	Mean
G1	0	0	4	11	10	4.24
G2	0	0	6	11	8	4.08

*SD -Strongly Disagree, D -Disagree, SA -Slightly Agree, A -Agree, SA -Strongly Agree

Feedback

Feedback allows a player to determine the gap between the current stage of knowledge and the knowledge required for ultimate completion of the game's task. Table 5 shows that the positive agreeability on agreeability received feedback on user goals through the game. Most of the respondents valued that they agree with 40%. This is followed by respondents who strongly agree with 28%. This is proven the on agreeability received feedback on user goals through the game. There is a positive agreeability notify with new task immediately. Most respondents, at 44%, expressed agree with this feature. Additionally, 36% of respondents strongly agree, indicating a strong consensus on the effectiveness of notify with new task immediately. This confirms the positive reception of the notify with new task immediately as reported in the survey.

Table 5: Result on Feedback

Feedback	SD	D	SA	A	SA	Mean
F1	1	0	7	10	7	3.88
F2	0	1	4	11	9	4.12

*SD -Strongly Disagree, D -Disagree, SA -Slightly Agree, A -Agree, SA -Strongly Agree

Immersion

The game effectively immerses players, as shown in Table 6. A significant portion, 20%, strongly agree that they forget about time while playing, while 36% agree or slightly agree with this notion. This highlights the game's ability to create an immersive experience where time passes unnoticed. Additionally, 40% of respondents agree that they feel engaged in the game, with 24% strongly agreeing. This indicates a consensus on the game's effectiveness in involving players. Moreover, 48% agree that they become unaware of their surroundings while playing, with 12% strongly agreeing. This suggests that players feel a sense of control and impact over the game.

Table 6: Result on Immersion

Immersion	SD	D	SA	A	SA	Mean
I1	1	1	9	9	5	3.64
I2	0	0	9	10	6	3.88
I3	1	2	7	12	3	3.56

*SD -Strongly Disagree, D -Disagree, SA -Slightly Agree, A -Agree, SA -Strongly Agree

Knowledge Improvement

Table 7 shows the game effectively increases users' knowledge, as indicated by survey results. Most respondents, 40%, strongly agree, and another 40% slightly agree that the game enhances users' knowledge. Additionally, 56% of respondents agree and 24% strongly agree that users grasp the basic ideas taught in the game. Moreover, 60% of respondents agree and 24% strongly agree that they want to learn more about the knowledge presented in the game. Overall, these findings confirm that the game successfully increases users' knowledge and encourages further learning.

Table 7: Result on Knowledge Improvement

Knowledge Improvement	SD	D	SA	A	SA	Mean
K1	0	1	4	10	10	4.16
K2	0	0	5	14	6	4.04
K3	0	0	4	15	6	4.08

*SD -Strongly Disagree, D -Disagree, SA -Slightly Agree, A -Agree, SA -Strongly Agree

Overall Finding

Table 8 shows the average scores for each dimension of MentalCare, calculated by averaging the scores of all items within that dimension. These averages were then combined to determine an overall average value, which helped in evaluating MentalCare using the EGameFlow model.

Table 8 indicates that the overall average score for all dimensions is slightly higher than the agreeability score for the EGameFlow dimension. The Goal clarity dimension has the highest average score of 4.16, suggesting that the game effectively communicates its purpose of increasing players' knowledge about mental health. MentalCare aims to raise awareness about mental health, and this dimension reflects that goal. According to Fu, F. L., Su, R. C., and Yu, S. C. (2009), providing a sense of delight is a primary benefit of learning tools for students. Additionally, the scores for other dimensions are also above the acceptable limit, indicating that the game adheres to the guidelines for each dimension in the EGameFlow model.

The enjoyment of MentalCare is determined by calculating the percentage of the total average, resulting in an overall average of 3.98. This indicates a high level of agreeableness, with 80% of respondents finding the game enjoyable. Thus, the project's goals of developing a

2D video game with a game-based learning concept to promote mental health awareness and assessing user satisfaction with the game have been successfully achieved.

Table 8: Total average for each dimension and overall average value

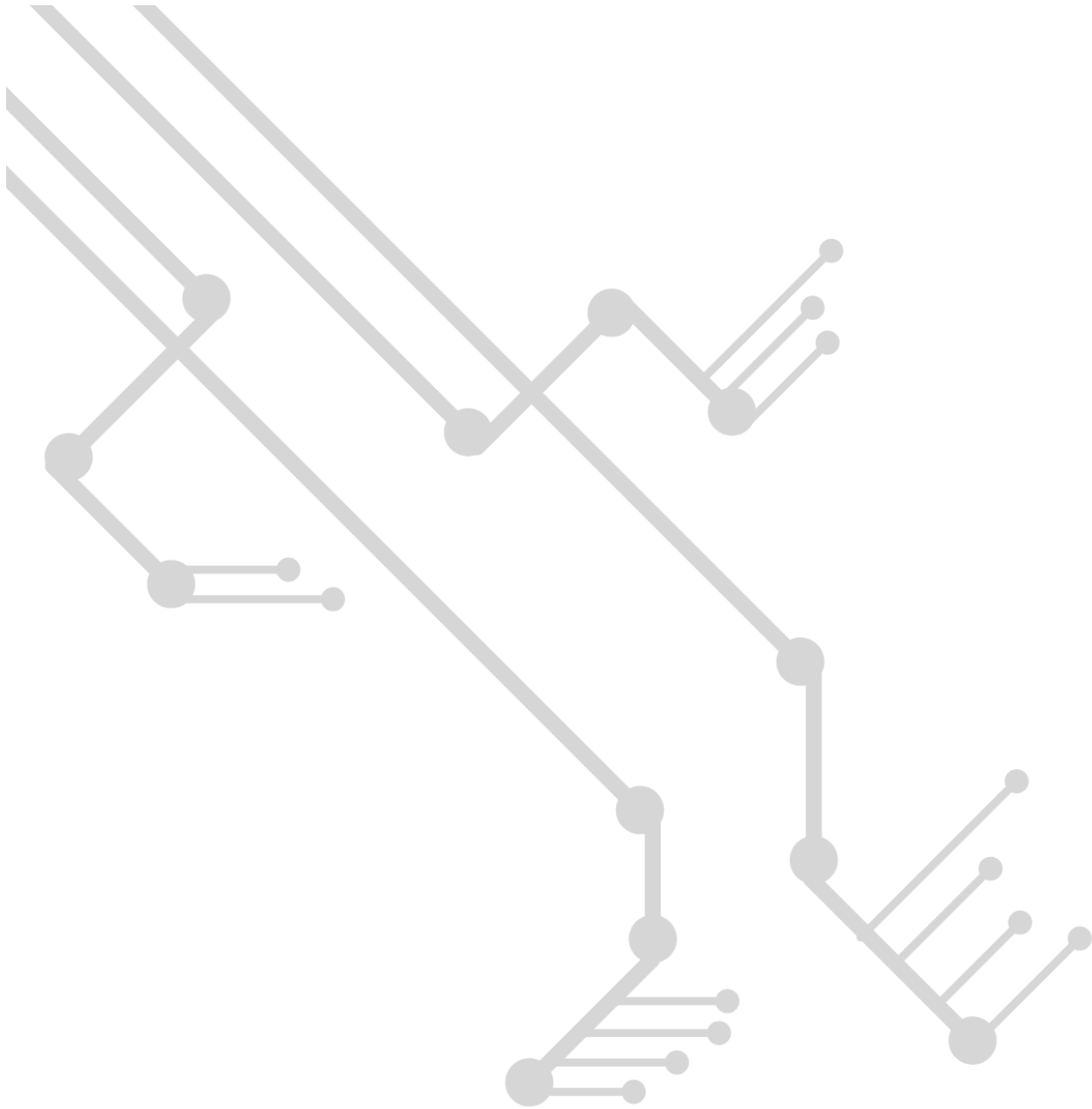
Dimension	Item	Mean
Concentration	C1	3.84
	C2	4.04
Total Mean		3.94
Goal Clarity	G1	4.24
	G2	4.08
Total Mean		4.16
Feedback	F1	3.88
	F2	4.14
Total Mean		4.00
Immersion	I1	3.64
	I2	3.88
	I3	4.12
Total Mean		3.70
Knowledge Improvement	K1	4.16
	K2	4.04
	K3	4.08
Total Mean		4.10
Overall		3.98
Percentage of Overall Average		80%

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