PCMJ

Progress in Computing and Mathematics Journal

volume 1

https://fskmjebat.uitm.edu.my/pcmj/

PCMJ

Progress in Computing and Mathematics Journal

volume 1

EDITORS

Ahmad Firdaus Ahmad Fadzil
Khyrina Airin Fariza Abu Samah
Raihana Md Saidi
Shahadan Saad
Sheik Badrul Hisham Jamil Azhar
Zainal Fikri Zamzuri
Siti Feirusz Ahmad Fesol
Salehah Hamzah
Raseeda Hamzah
Mohamad Asrol Arshad
Mohd Hafifi Mohd Supir
Nurul Hidayah Mat Zain
Syamsul Ariffin Yahaya
Edzreena Edza Odzaly

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
UiTM Cawangan Melaka

TABLE OF CONTENTS

SIMPLIFIED DRONE GAME FOR INITIAL REMEDIAL INTERVENTION FOR DYSPRAXIA AMONG KIDS

Mohd Sahrin Ab Satar
sahrin2112@gmail.com
*Corresponding author

Azlan Abdul Aziz
azlan225@uitm.edu.my

Article Info	Abstract
	Dyspraxia, alternatively referred to as developmental coordination disorder (DCD), is an early-onset neurodevelopmental disorder. It interferes with coordination and motor (movement) abilities. A diverse array of difficulties pertaining to movement and coordination can be impacted by dyspraxia, thereby presenting obstacles to tasks such as writing, operating a bicycle, or fastening buttons. The research indicates that children diagnosed with dyspraxia consistently struggle with coordination issues, movement difficulties, and cognitive impairments. This research aims to create a simplified drone game that can be utilised by children with dyspraxia as an initial remedial intervention. Rapid Application Development (RAD) was utilised for this project because it offered a more secure and expedient development process, which was ideal for this project. This game application utilises the International Classification of Functioning, Disability, and Health (ICY-CY) framework, and the observation method is being employed to assess the game's efficacy. The result indicates that adjustments should be made to the activities in order to increase their efficacy in aiding children with dyspraxia during the remedial process. Further development could be made by incorporating a wider range of challenges and quizzes. At the end of this project a total of 72.73% of players managed to finish the game faster than at previous games and as many as 93% of research results show the effectiveness of this game in helping remedial intervention for dyspraxia among kids.

INTRODUCTION

Dyspraxia is also known as Developmental Coordination Disorder (DCD). This disorder has been used to characterize abnormal motor behaviors or problems with motor movement (Jackson & Andipatin, 2021). According to Kalsoom et al., (2019.), Dyspraxia is a chronic disorder or lifelong condition, where they have difficulty in fine motor coordination and mouth

PCMJ

Progress in Computer and Mathematics Journal (PCMJ)
volume 1 [October, 2024]
e-ISSN: 3030-6728
Website: fskmjebat.uitm.edu.my/pcmj

manipulation. Authors also stated that dyspraxia as a neurological disorder, developmental dyspraxia takes place in the brain, where we are unable to see. Because it is a motor learning issue, the disability is present from birth. Another explanation, dyspraxia also recognized as "Clumsy Child Syndrome" or "Minimal Brain Damage" (Konstantopoulou & Trapali, 2023). There is no cure for Developmental Coordination Disorder (DCD), but there are ways to help. A small number of children, usually those diagnosed early and with mild symptoms, may be able to learn how to overcome difficulties. Training using physical movement is one of the initial remedial interventions that can help DCD's people to improve their motor performance skills (NHS Choices, 2023).

The World Health Organization stated that almost 4.7 million Malaysian with various disabilities but only 500,000 are registered (Suraya Ali, 2022). Here in Malaysia, Dyspraxia, Autism Spectrum Order (ACD), Down Syndrome and Cerebral Palsy are commonly receiving integrative special education in formal primary and secondary school under government program in mainstream school (Mohamad et al., 2018).

Problem Statement

Lack of coordinate movement

According to the Adi-Japha & Brestel, (2020), in DSM-5 criteria stated children with DCD having difficulties in motor performance. They also appear clumsy, awkward, and uncoordinated when performing fine or gross tasks. Children affected by this disorder will counter problems for example to dress, using cutlery, drawing, or painting even have difficulty to using scissors. This issue will lead to primary schools that will have difficulty in writing or typing (Biotteau et al., 2019).

Difficulty in cognitive ability

Children with DCD prove that they have difficulty in executive functioning for an example working memory, inhibition, planning and fluency, mathematical performance, planning foe end-state comfort, oculomotor processes, motor imagery and others (Caçola & Lage, 2019). Executive control allows us to divide our split attention and be able to process multiple tasks

at once. Usually, children with normal condition or typical development can perform two activities or tasks at the same time especially if the tasks are easy (L. D. Jelsma et al., 2021).

LITERATURE REVIEW

Prevalence of Dyspraxia Among Children

According to Medindia, (2022) dyspraxia affects children in varying degrees; some are more badly impacted than others. Symptoms usually occur very early in life when the child is still a newborn. A few symptoms may improve as the youngster grows. Children with DCD may be unable to properly grasp a spoon, they may choose to eat with their fingers or hand. They may drop food and are sometimes referred to as messy eaters. They also could avoid engaging with building toys, blocks, or puzzles, and might have difficulty riding tricycles. DCD may frequently trip when walking or running. Toilet training a child is difficult when compared to other youngsters their age.

Children with dyspraxia display a complex symptomatology that involves purposeful movement, sensorineural integration, executive functioning, as well as emotional and interpersonal components. They make it difficult to plan, be on time, stay focused over time, and anticipate how much time something will take. These kids struggle with how to organize their personal, peri personal, and us-focused environment. They adopt asymmetrical postures, prioritise a location relative to the contralateral and require visual confirmation of their actions to be recognised. They struggle to establish eye contact and judge distances, coming too close or too far away from the other person due to visual exploration issues (Mosca et al., 2020).

Importance of Early Intervention of Dyspraxia

Dyspraxia is considered a major learning barrier among school-aged children and researchers stated that as a hidden problem towards children. Nonetheless, the prevalence of the condition may be higher than currently thought, and many children go missing or go undiagnosed due to lack of awareness.

Children with motor disabilities are often described as helpless and may be delayed in achieving motor development milestones such as crawling and walking. In addition, balance and coordination problems can occur. Visual and perceptual problems. Poor short-term memory, poor posture, and speech. and abnormal muscle tone. Moreover, children with motor disabilities may have difficulty learning to ride a bike and may be dependent on self-care activities such as grooming, dressing, and eating. In addition, school can make it difficult to write, cut, draw, complete assignments on time, and participate in sports activities (Pedro & Goldschmidt, 2019).

Importance of Early Intervention of Dyspraxia

Motor skills play an important role in determining the course of a person's life. This skill is an internal instrument that influences a person's involvement through physical activity. It is related to physical activity to ensure the physical health of children and teenagers. Dynamic interaction between motor skills and physical activity reveals children and adolescents to environmental and interpersonal stimuli interaction of various complexity, promoting dexterity, coordination, and cardiorespiratory development fitness, improving their motor experience, which is next improve the function of molecules, cells and neural circuits in the nervous system and improve brain structure and functional activity (Shi & Feng, 2022).

International Classification of Functioning, Disability and Health Children & Youth Version (ICY-CY) Framework.

ICF-CY is intended for clinicians, educators, policy makers, family members, consumers, and researchers to record the characteristics of health and activity in children and young people. ICF-CY provides a conceptual framework and a common language and terminology to document problems manifesting in infancy, childhood, and adolescence related to body structure and function, activity and participation limitations, and environmental factors.

School is important for children and young people. Focused on operations, ICF-CY can be used across industries, government sectors, and national boundaries to identify and document the health, activity, and development of children and young people. Below in Figure 1 is Interaction between the components of ICF.

Figure 1: Interaction between the components of ICF
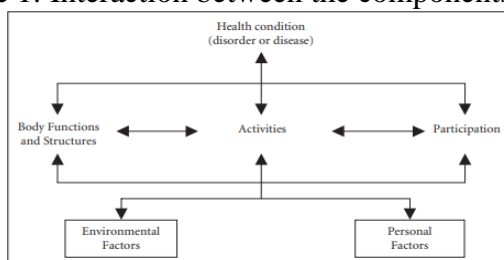
This project implements two sensory according in framework for chapter 4: Mobility. This framework focuses on carrying, moving, and handling objects. To relate with this project, the framework id d445 were implemented as attached below in figure 2.

Figure 2: Hand and arm use

Lastly this application needs a player or children with DCD to have the skill to complete several tasks. In chapter 2, this framework focuses on general task and demand where on d210 classification mentioned about Undertaking a single task. This is to carry out single or multiple tasks, organizing routine and handling stress. For this game application, players need to complete several tasks before winning the game. Figure 3 below shows the general task and demands.

d 220	Undertaking multiple tasks
	Carrying out simple or complex and coordinated actions as components of multiple, integrated and complex tasks in sequence or simultaneously.
	Inclusions: undertaking multiple tasks; completing multiple tasks; undertaking multiple tasks independently and in a group
	Exclusions: acquiring skills (d155); solving problems (d175); making decisions (d177); undertaking a single task (d210)
d 2201	Completing multiple tasks
	Completing several tasks, together or sequentially, such as getting up and getting ready to leave for school, shopping and completing errands for a friend while shopping.

Figure 3: General Task and Demand

METHODOLOGY

This application development methodology defines the design of the application lifecycle by providing rapid, high-quality development. Time efficiency is the advantage of RAD over other software development methods that require a longer process. Application development using RAD is a great opportunity that can be exploited in the development process.

Rapid Application Development (RAD) Phase

RAD methodology contains of four phases which are: requirement planning, user design, construction, and cutover. Below in figure 4 shows RAD phases.
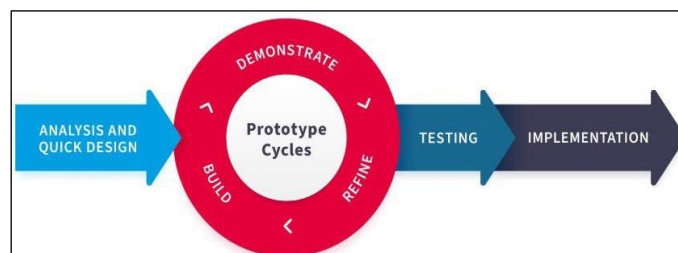
Figure 4: Rapid Application Development methodology

Requirement Planning Phase

This project required the analysis and identification of game genre, perspective, and dimension. This phase also included the selection of appropriate software. Figure 5 shows the requirement planning phase.
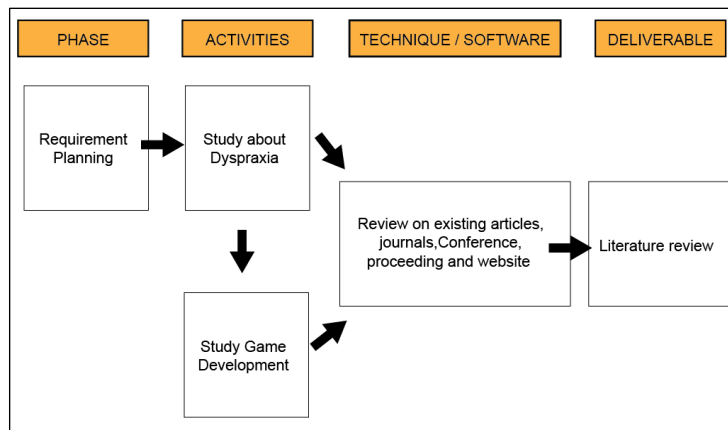
Figure 5: Requirement Planning Phase

User Design Phase

Next phase is to design the system based on the input from the previous phase. A prototype is created, tested, and amend based on the user's responses to the details design of the application. For this project, flowchart and storyboard were created to give a view of the flow and design of the project. Figure 6 shows the user design for this project.
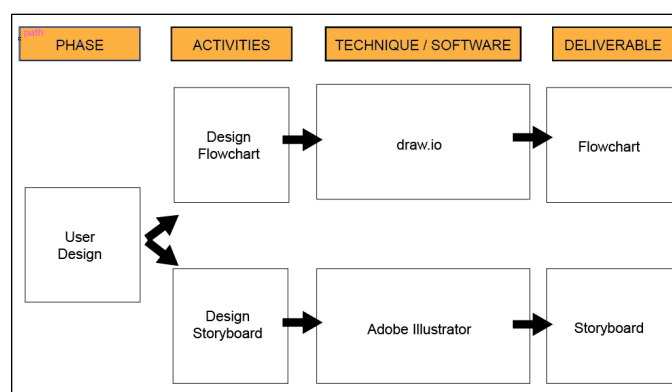
Figure 6: Requirement Planning Phase

Flowchart

Flowchart is a diagram that portray a process, system, or computer algorithm. Figure 7 shows the flowchart of the game. When user or player starts the game, the layout of the screen will

PCMJ

Progress in Computer and Mathematics Journal (PCMJ)
volume 1 [October, 2024]
e-ISSN: 3030-6728
Website: fskmjebat.uitm.edu.my/pcmj

display a main menu whereby the player able to choose either to play the game, read the instructions or quit the game. A demonstration video about how to play the game will be display when player select button instructions. If the player select button quit, the application will be close. When player select to play the game, they are allowed to select any stages from easy, medium, or hard. Figure 7 below shows flowchart of the Sky Strike game.
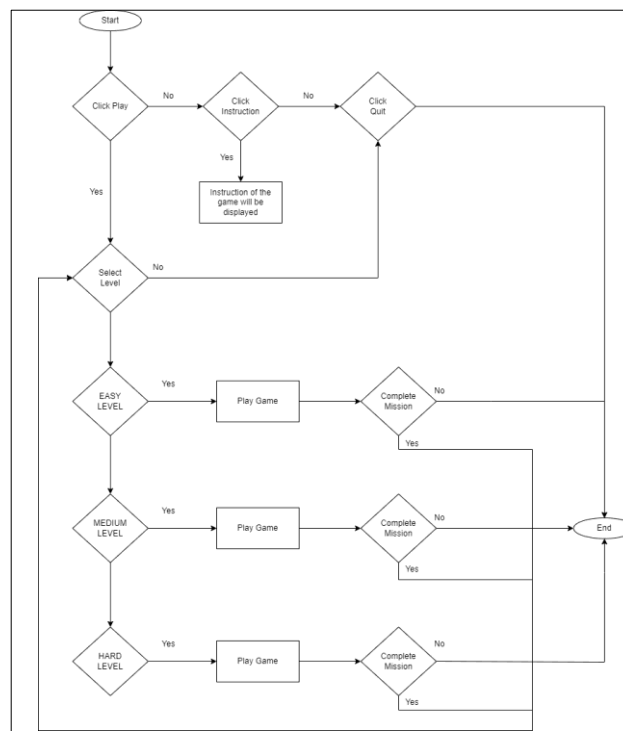
Figure 7: Flowchart of the game

Construction Phase

The next phase in RAD is the construction phase. In this phase the prototype was built into a fully developed system. Users may continue to give a respond to any changes or improvement. All design including interface, technical and coding was done in this phase. Various software is utilized for the development of Sky Strike Game. Figure 8 shows the construction phase for this project.

.
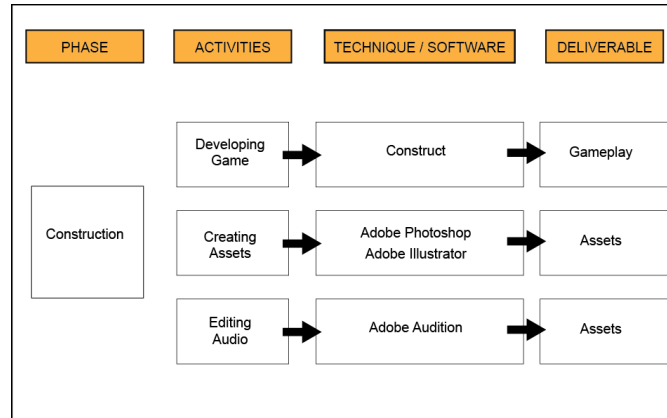
Figure 8: Construction phase of the game

Software and Hardware Requirements

Developing games requires appropriate software and hardware capabilities. The Sky Strike game is developed using Windows 10 software. For model development, Blender software is used to design the assets found in this game project. While for the engine game, Unreal Engine is used as the development platform. Adobe Photoshop, Adobe Illustrator and Adobe Audition are used for graphics and sound mixing respectively. Table 1 shows required software that user to develop Sky Strike game.

Table 1: Required software that user to develop Sky Strike game.

Item	Feature	Software
1	Operating System	Windows 10
2	Game Engine	Construct3
3	Graphic Editing Tool	Adobe Photoshop, Adobe Illustrator
4	Audio Editing Tool	Adobe Audition

High hardware specifications are recommended o developing a game. The process of developing game required a large of memory and space on the machine. By having a good hardware on a machine, the process can speed up and avoid unwanted complication during the developing process. Table 2 below shows the Sky Strike hardware and specifications that used.

Table 2: Hardware and specification to develop Sky Strike game.

Item	Feature	Software
1	CPU	Intel® Core™ i7-7500U @ 2.70GHz 2.90 GHz
2	RAM	12.00 GB
3	GPU	Intel® HD Graphic 620
4	STORAGE	250 GB SSD

Cutover Phase

This phase is where the output of product is completed and ready for testing and evaluation. User executed the testing to make sure the final application worked without any problems or issues.

Participants

According to Mohamad et al., (2018) in Malaysia, dyspraxia, autism spectrum disorder (ACD), down syndrome and cerebral palsy are often integrated into special education in mainstream primary and secondary schools under the government's general school curriculum. Difficulty performing fine motor movements has also been observed and is one of the most reported motor findings in children with autism (Dziuk, n.d.). The study participants were 11 children in Program Pendidikan Khas Integrasi (PPKI) who have characteristics like those who have DCD in the state of Melaka. The children involved will be asked to play the game with the permission of their parents/guardians first.

Instruments

Effectiveness is assessed in the user's ability to complete an assignment in a game application (Ismail et al., n.d.). The evaluation method that carried out is through the observation process. All task that must be completed.

RESULT AND DISCUSSION

Data obtained from users has been separated into numerous components and calculated to determine the effectiveness of the Sky Strike game. Each of the factors will be discussed further below.

Concentration

Figure 9 below shows the total number of results from respondents evaluating the length of Sky Strike game time for 2 sessions per player.

No	Respondent	Easy Level		Medium Level		Hard Level		Progress
		1st trial	2nd trial	1st trial	2nd trial	1st trial	2nd trial	Faster Time
1	Child 1 (C1)	38	20	48	35	137	84	3/3
2	Child 2 (C2)	20	17	45	39	85	71	3/3
3	Child 3 (C3)	33	24	47	37	72	58	3/3
4	Child 4 (C4)	24	16	22	25	38	41	1/3
5	Child 5 (C5)	44	22	74	85	150	149	2/3
6	Child 6 (C6)	16	19	18	16	23	28	1/3
7	Child 7 (C7)	93	55	288	64	175	146	3/3
8	Child 8 (C8)	40	27	60	39	103	43	3/3
9	Child 9 (C9)	16	18	29	28	47	43	3/3
10	Child 10 (C10)	25	23	48	42	120	54	3/3
11	Child 11 (C11)	105	30	124	62	132	62	3/3

Figure 8: Time Record for All Levels of The Game

From the figure above, a total of 8 children out of 11 managed to finish all three levels of Sky Strike games with shorter time frames compared to their first game or in percentage, 72.73%. Effectiveness assesses the user's ability to successfully accomplish a job within the program. In this study, the effectiveness of each screen is measured. A comprehensive list of all jobs that require completion is provided. Upon successful completion of a task, it will be designated as a 'Yes'. A success mark is attributed with the complete credit of 100%. Partial credit will be

Progress in Computer and Mathematics Journal (PCMJ)
volume 1 [October, 2024]
e-ISSN: 3030-6728
Website: fskmjebat.uitm.edu.my/pcmj

PCMJ

provided in the form of a 'Partial' mark, granting 50% credit. Tasks that are not successfully completed will receive a 'No' mark. 'No' marks receive a credit of zero (0%).

No	Question	Code
1	The child does not have trouble to navigate using mouse	S1
2	The child does not have trouble to find the start menu	S2
3	Graphics used on the page attract the child	S3
4	Music used attract the child	S4
5	Size of the game window opened is good enough	S5
6	The child does not have trouble to move the character around using keyboard	S6
7	The child does not have trouble to aim the target around using mouse	S7
8	The child knows what to do during the game play	S8
9	The child gives focused on the game	S9
10	The child shows a positive reaction during the game. play	S10
11	The child clicks the mouse only where it should	S11
12	The child clearly knows the obstacle that should be avoided	S12
13	The child knows clearly what should be shoot	S13
14	The child understood the overall character exploration concept	S14

Figure 9: List of Assessed Elements

PCMJ

Code	Child 1	Child 2	Child 3	Child 4	Child 5
Start Screen					
S1	Yes	Yes	Yes	Yes	Yes
S2	Yes	Yes	Yes	Yes	Yes
S3	Yes	Yes	Yes	Yes	Yes
S4	Yes	Yes	Yes	Yes	Yes
S5	Yes	Yes	Yes	Yes	Yes
Sky Strike Game Exploration					
S6	Yes	Partial	Yes	Partial	Yes
S7	Yes	Yes	Yes	Yes	Partial
S8	Yes	Yes	Yes	Yes	Yes
S9	Yes	Yes	Yes	Yes	Yes
S10	Yes	Yes	Yes	Yes	Yes
S11	Yes	Yes	Yes	Yes	Yes
S12	Yes	Yes	Yes	Yes	Yes
S13	Yes	Yes	Yes	Yes	Yes
S14	Yes	Yes	Yes	Yes	Yes

Code	Child 6	Child 7	Child 8	Child 9	Child 10	Child 11
Start Screen						
S1	Yes	Partial	Yes	Yes	Yes	Partial
S2	Yes	Yes	Yes	Yes	Yes	Partial
S3	Yes	Yes	Yes	Yes	Partial	No
S4	Yes	Yes	Yes	Yes	Yes	Yes
S5	Yes	Yes	Yes	Yes	Yes	Yes
Sky Strike Game Exploration						
S6	Yes	Partial	Yes	Yes	Partial	Partial
S7	Yes	Partial	Partial	Yes	Yes	No
S8	Yes	Yes	Yes	Yes	Yes	Yes
S9	Yes	Yes	Yes	Yes	Yes	Yes
S10	Yes	Yes	Yes	Yes	Yes	Partial
S11	Yes	Yes	Yes	Partial	Partial	No
S12	Yes	Yes	Yes	Yes	Yes	Yes
S13	Yes	Yes	Yes	Yes	Yes	Yes
S14	Yes	Yes	Yes	Yes	Yes	Yes

Figure 10: Analysis of Assessed Elements

Answer	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	Subtotal
Yes	14	13	14	13	13	14	11	13	13	11	7	**136**
Partial	-	1	-	1	1	-	3	1	1	3	4	**15**
No	-	-	-	-	-	-	-	-	-	-	3	**3**

Figure 11: Summary of Effectiveness Analysis Table

Figure 11 displays 14 tasks, each with 11 attempts, for a total of 154 attempts. 136 efforts were successful, while 15 were partially successful. There are three unsuccessful assignments that will be ignored because three times 0% equals zero. To determine the total effectiveness rating for this set of tasks, following equation is applied:

$$\text{Effectiveness (\%)} = (\text{Yes} + (\text{Partial} \times 0.5)) / 154 \times 100\%$$
$$= (136 + (15 \times 0.5)) / 154 \times 100 \qquad 1$$
$$= \textbf{93.18\%}$$

REFERENCES

Adi-Japha, E., & Brestel, G. (2020). Motor skill learning with impaired transfer by children with developmental coordination disorder. Research in Developmental Disabilities, 103. https://doi.org/10.1016/j.ridd.2020.103671

Biotteau, M., Danna, J., Baudou, É., Puyjarinet, F., Velay, J. L., Albaret, J. M., & Chaix, Y. (2019). Developmental coordination disorder and dysgraphia: Signs and symptoms, diagnosis, and rehabilitation. Neuropsychiatric Disease and Treatment, 15, 1873–1885. https://doi.org/10.2147/NDT.S120514

Caçola, P., & Lage, G. (2019). Developmental coordination disorder (DCD): An overview of the condition and research evidence. Motriz. Revista de Educacao Fisica, 25(2). https://doi.org/10.1590/s1980-6574201900020001

Dr. Sunita Sayammagaru. (2022, June 18). What are the Symptoms of Dyspraxia? Medindia.

Jackson, K., & Andipatin, M. (2021). An exploration of the challenge's fathers' experience when parenting a child that presents with dyspraxia. Qualitative Research Journal, 21(4), 424–443. https://doi.org/10.1108/QRJ-09-2020-0103

Jelsma, L. D., Geuze, R. H., Fuermaier, A. B. M., Tucha, O., & Smits-Engelsman, B. C. M. (2021). Effect of dual tasking on a dynamic balance task in children with and without DCD. Human Movement Science, 79. https://doi.org/10.1016/j.humov.2021.102859

Kalsoom, T., Haseeb Mujahid, A., & Aziz, F. (n.d.). Learners with Dyspraxia: Teachers' Perceptions at Elementary Level Learners with Dyspraxia. In Journal of Elementary Education (Vol. 29, Issue 1).

Konstantopoulou, E., & Trapali, M. (2023). Verbal Dyspraxia: A Case Study. Open Journal of Preventive Medicine, 13(01), 1–10. https://doi.org/10.4236/ojpm.2023.131001

Mohamad, N. A., Ern, Y. Y., Azlin, N., Nordin, M., & Zanudin, A. (2018). MOTOR COORDINATION PERFORMANCE DIFFERENCES BETWEEN SCHOOL CHILDREN WITH AND WITHOUT DEVELOPMENTAL COORDINATION DISORDER ATTENDING INTEGRATIVE SPECIAL EDUCATION IN KLANG VALLEY. In

Malaysian Journal of Public Health Medicine (Issue 1).

Mosca, L. L., Sperandeo, R., Cioffi, V., Cantone, D., Moretto, E., Longobardi, T., Alfano, Y. M., Continisio, G. I., Muzii, B., Bottone, M., & Maldonato, N. M. (2020). Dyspraxia: An impairment of the structure and functions of the individual mind : estudy perspective and intervention. 11th IEEE International Conference on Cognitive Infocommunications, CogInfoCom 2020 - Proceedings, 133–140. https://doi.org/10.1109/CogInfoCom50765.2020.9237860

NHS Choices. (2023, March 8). treatment - Developmental co-ordination disorder (dyspraxia) in children. https://www.nhs.uk/conditions/developmental-coordination-disorder- dyspraxia/treatment/

Pedro, A., & Goldschmidt, T. (2019). Managing dyspraxia: Pre-school teachers' perceptions, experiences and strategies. Journal of Psychology in Africa, 29(2), 182–186. https://doi.org/10.1080/14330237.2019.1603346

Shi, P., & Feng, X. (2022). Motor skills and cognitive benefits in children and adolescents: Relationship, mechanism and perspectives. In Frontiers in Psychology (Vol. 13). Frontiers Media S.A. https://doi.org/10.3389/fpsyg.2022.1017825

Suraya Ali. (2022, June 16). Facing challenges of being "different." Sun Media Corporation Sdn. Bhd. https://www.thesundaily.my/home/facing-challenges-of-being-different-YE9336515
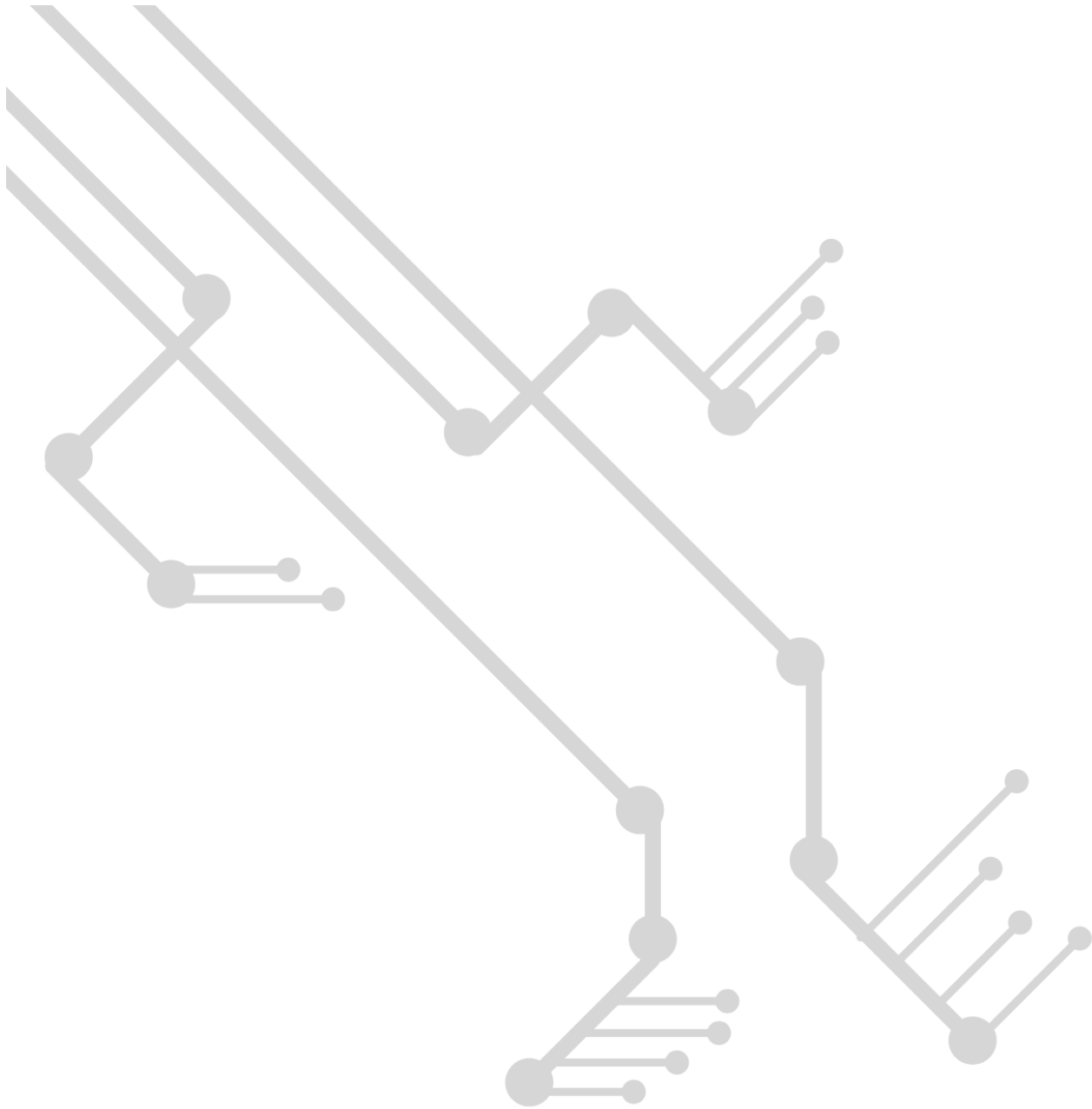
PCMJ

Progress in Computing and Mathematics Journal

UNIVERSITI TEKNOLOGI MARA | Cawangan Melaka