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## Walkmeter as an alternative method to enhance elementary school students ability in solving velocity and acceleration problems

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**Abstract:** Understanding physics relies heavily on mastering mathematical formulas, essential for problem-solving, critical thinking, reasoning, and communication. Yet, students struggle due to uninspiring explanations, leading to lost focus during learning. One such topic that involves mathematical formulas in physics is velocity and acceleration. This study aims to assist physics students from Sekolah Menengah Kebangsaan Putrajaya Presint 16(1), Malaysia who have difficulties in solving velocity and acceleration drill questions by using the Walkmeter application for learning. This approach also aims to improve and enhance the teaching practices of the teacher and increase students' interest and achievement in solving velocity and acceleration questions. Initial observations during the teaching and learning process showed that there were students who were unclear and took a long time to master the velocity and acceleration drill exercises. Initial surveys through observations, document analysis, and questionnaires indicated that students easily lose focus. The difficulty in remembering formulas and the conventional methods that are not suitable caused students to take a long time to solve drill questions. An action plan was devised by developing the WalkMeter application outside the classroom. Information gathered from observations and questionnaires showed an improvement in students' interest, attitudes, and achievements after using the WalkMeter application. Overall, this study has successfully enhanced the quality of teaching by teachers and the learning experiences of students in solving velocity and acceleration drill questions more easily and effectively. This has made the out-of-classroom teaching and learning process more meaningful.

**Keywords:** WalkMeter Application; velocity and acceleration; digital education transformation

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### Introduction

The topic of velocity and acceleration is one of the topics in the Physics subject for Form 4 students under the Malaysian Standard Curriculum (KSSM) which involves mathematical formulas. Physics is also related to mathematics because many mathematical formulas need to be applied in this subject (Akmar et al., 2021; Halim, et al., 2014). Suitable and effective teaching methods aim to produce effective learning in the classroom. One of the common teaching methods used in the classroom is the explanation method. However, teaching by simply explaining the subject matter is usually boring and causes students to lose focus during learning (Nursaila, 2017).

The topic of velocity and acceleration in the Form 4 Physics subject is calculation-based and involves mathematical formulas that are typically taught through the explanation method. The

explanation method is the right method (Skuka, 2015), but it needs to be supplemented with the demonstration method (Inderanata & Sukardi, 2023) and the use of technology (Gil-Flores et al, 2017). As an alternative to explanation-based teaching, digital-based learning methods can be implemented as they can capture students' attention and be enjoyable (Hussain et al., 2018; Blamire, 2010).

Therefore, the role of teachers in responding to digital education transformation with the use of technology such as developing learning applications using algorithmic programming (coding blocks) needs to be integrated into Physics teaching and learning so that it can help students actively engage in learning and form a deep understanding of a concept and connect the learning concept with the real world.

### Method

This study aims to examine the effects of using the alternative method, namely the Walkmeter application, in assisting Form 4 students to complete exercises on the topics of speed and acceleration. Figure 1 below depicts Action Research Model (Kemmis & McTaggart, 1988), which serves as the main guide in designing, implementing, and evaluating this research study, consisting of four phases: planning, action, observation, and reflection.

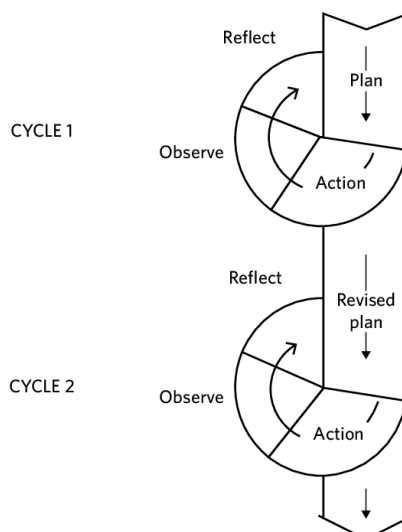


Figure 1. Kemmis & McTaggart (1988) Action Research Model

The document analysis technique is used to review the performance of study participants in the subject of Physics, while the collection of study participant scores in this topic is recorded as Table 1.

Table 1. Self-assessment scores (Pre-test) for the topic of speed and acceleration

Score	Grade	Classification	Number of Students	Percentage %
80-100	A	Excellent	3	7.9
60-79	B	Good	12	31.6
40-59	C	Satisfactory	18	47.4
20-39	D	Weak	5	13.2
0-19	E	Very Weak	0	0.0

To achieve the research objectives, an application named WalkMeter was developed. This application utilizes MIT Inventor software by programming algorithmic blocks in the topics of speed and acceleration aimed at enhancing students' active engagement and improving their achievement. According to Sayed et al., 2014, teaching strategies should frequently involve digital education transformations. Therefore, several software programs using coding blocks were identified to specify mathematical formula variables and link clear, concise, and accurate mathematical notifications.

### Storyboard

Before the application was developed, a storyboard was prepared at the initial stage of the design process to facilitate the development of the WalkMeter application (Figure 2).

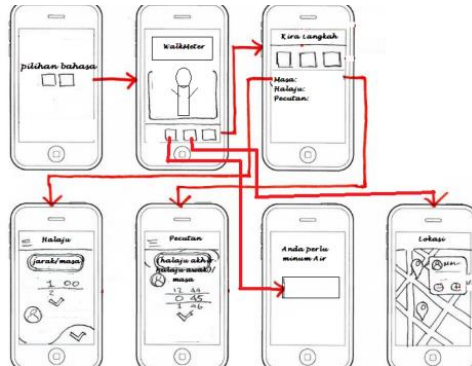


Figure 2. Storyboard drawn before developing the WalkMeter application

This application was developed using MIT App Inventor 2 software, using block-based programming language, and MIT AI2 Companion (Figure 3). In addition to that, background remover software, Paint 3D software, and Canva software were also used in developing this application.



Figure 3. Software used to develop the WalkMeter application

### Programming

The programming (coding blocks) were executed by following computer logic and using available buttons to insert desired components such as images (picture) and buttons onto the screen (Figure 4). Mathematical formulas were implemented using math coding blocks on the built-in buttons and pedometer sensor buttons to generate accurate calculations during running.

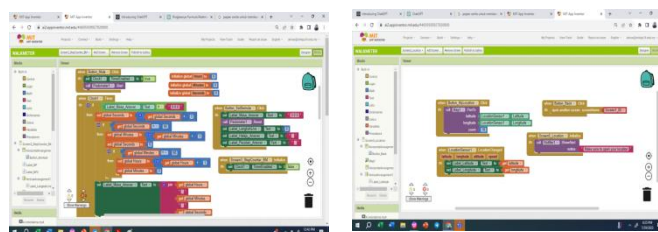


Figure 4. Coding blocks generated in the WalkMeter application

### Results and Discussion

The instructional method has been transformed into digital education transformation by downloading the WalkMeter application onto the study participants' smartphones before the STO 2023 Running Program. Clear instructions for downloading the WalkMeter application are shown in the following link: [<https://vt.tiktok.com/ZSLxLPwaQ/>](<https://vt.tiktok.com/ZSLxLPwaQ/>). The STO Great Run Program is a cross-village program renamed according to current suitability and needs. This program is part of the 1M1S (one student one sport) activity for SMK Putrajaya Presint 16 (1) and was held on July 13, 2023. Images with sufficient resolution can be seen in Figure 5.

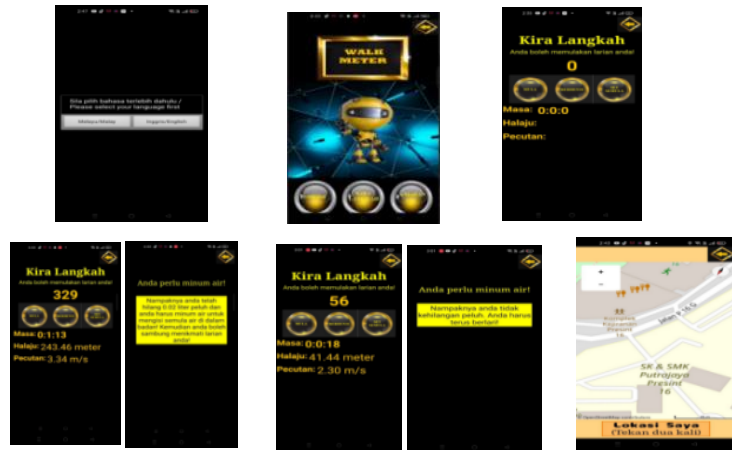


Figure 5. Figure with Sufficient Resolution

There was an increase in the percentage of scores in the post-test (99.5%) compared to the pre-test (78.7%), representing an increase of 20.8% (Figure 6). This indicates the effectiveness of the digital education transformation method in improving student achievement in the learning process of Physics. This research finding is supported by the study by Akmar et al., 2021, which shows an improvement in student achievement through digital education transformation.

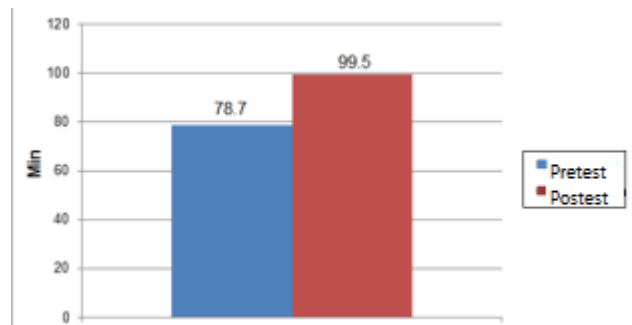


Figure 6. Comparison between scores pre-test and post-test

The advancements in mobile technology allow various teaching methods to be adapted to create something new in the learning process. According to Gustafson & Branch, 2002, the integration of pedagogy and mobile technology has great potential in education, especially when applied in outdoor activities to enable students to explore real-life situations. Well-organized and appropriate planning is essential for teachers to develop effective digital learning in the topic of speed and acceleration to enhance student engagement and achievement.

### Conclusion

WalkMeter can serve as a reference and guide for researchers and teachers to develop similar digital education for teaching and learning purposes. As a suggestion for improvement, incorporating artificial intelligence (AI) concepts into the WalkMeter application by implementing facial recognition and post-test data analysis automatically into the teacher's data system could be considered. This would allow teachers to systematically access information about students using WalkMeter without needing to meet them to obtain their scores. However, the customization of this method should be done according to the level and suitability of the students.

### References

Akmar, N., Mustamam & Huda, N. (2021). *Development of phyker games in the topic of electrical circuit for secondary school and its effect on students' achievement and motivation* Tesis Dr. Fal. Universiti Pendidikan Sultan Idris Malaysia.

- Blamire, R. (2010). *Digital Games for Learning: Conclusions and recommendations from the IMAGINE project*. European Schoolnet. Lifelong Learning Program.
- Gustafson, K. L., & Branch, R. M. (2002). *What is instructional design?* In Reiser, R. A. and Dempsey, J. V. (ed's) Trends and Issues in Instructional Design and Technology. Columbus: OH, Merrill Prentice Hall.
- Kemmis, S., & McTaggart, R. (1988). *The action research planner: Doing critical participatory action research*. Springer.
- Gil-Flores, J., Rodríguez-Santero, J., & Torres-Gordillo, J. J. (2017). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. *Computers in Human Behavior*, 68, 441-449.
- Halim, L., Yong, T.K. & Meerah. (2014). *Overcoming Student's Misconceptions on Forces in Equilibrium: An action Research Study*. Creative Education, 5, (pp.1032-1042).
- Inderanata, R. N., & Sukardi, T. (2023). Investigation study of integrated vocational guidance on work readiness of mechanical engineering vocational school students. *Heliyon*, 9(2).
- Hussain, S.Y.S., Tan, W. H., & Zaffwan, I, M. (2018). Kesan Pembelajaran berasaskan permainan digital Terhadap Pencapaian Matematik terhadap Kalangan Murid Sekolah Rendah. *Prosiding Seminar Kebangsaan ICT Dalam Pendidikan (pp. 240–245)*. Tanjung Malim, Malaysia.
- Nursaila, S. (2017). *Kesan permainan pendidikan terhadap pembelajaran hukum newton pelajar sekolah menengah*. Tesis Dr. Fal. Universiti Sains Malaysia.
- Skuka, A. (2015). Pedagogical Explanation Methods of Teaching Matrix Programming Operations: Effects on Students' Achievements in IPCs. *European Journal of Interdisciplinary Studies*, 1(3), 56-65.