



اُنِيُوْ تِكْنُوْلُجِي مَارَا
UNIVERSITI
TEKNOLOGI
MARA

What's *what* PSPM

EISSN: 2756-7729

MAC 2024/ VOL 1

UNDERSTANDING AND OVERCOMING MATH ANXIETY:
STRATEGIES FOR ACADEMIC SUCCESS !

UNLOCKING THE POWER OF NUMBERS:
WHY DO WE STUDY MATHEMATICS?

LEARNING HEAT EQUATION THROUGH GAMES

IS DATA SCIENTIST STILL THE SEXIEST JOB FOR 2024?



LEARNING HEAT EQUATION THROUGH GAMES

Aida Afrina Khusli, Nur Anis Izzati Abdull Razak , Nur Anis Natasha Zahurin,
*Ratna Zuarni Ramli & Siti Hidayah Muhad Saleh
Pengajian Sains Pengkomputeran dan Matematik
Kolej Pengajian Pengkomputeran, Informatik dan Matematik,
Universiti Teknologi MARA (UiTM),
Cawangan Negeri Sembilan, Kampus Seremban,
72000, Negeri Sembilan Darul Khusus, Malaysia.
ratna@uitm.edu.my

Students have difficulty comprehending the heat equation's topic since standard teaching approaches frequently fall short of making the connection between mathematical ideas and actual world [1]. According to [2], many students believe that mathematics is challenging, which reduces their excitement and weakens their ability to solve problems. This intensifies emotional tiredness and blocks the growth of critical thinking skills necessary for solving problems in the real world (Kartika et al., 2020). To address these issues, the study adopts a proactive action by seeking to determine the suitable partial differential equation (PDE) models emphasising the heat equation and its complex elements. This phase is essential for giving students a basis for a more useful and applied comprehension of the heat equation. Furthermore, the study intends to use the separation of variables (SOV) methods to solve the heat equation and include it in an instructional game. This approach is aligned with the potential of mobile mathematics resources combined with game-like aspects to improve comprehension [4].

Learning applications are more than just gamified textbooks; they are immersive mediums that promote a stronger connection between students and the subject matter. Incorporating interactive components is not a gimmick, but a purposeful decision that caters to different learning styles, ensuring that students connect with the learning application and serve as conduits for learning one-dimensional heat equations. For that purpose, a game learning application is developed using the Scratch Platform by focusing on a) Interface Development, b) Game Elements, c) Visual Illustration, d) Interactive features and finally, e) Testing and Debugging.

Creating a user-friendly interface for the Scratch platform, including screens, buttons, and interactive components, to allow for seamless engagement with educational content. Integrating the Separation of Variables (SOV) method while using game features like stages and scoreboards aimed to boost user engagement and provide an interactive learning experience within the application. The interactive learning experience can be improved by incorporating graphical representations, animations, and visual clues into the game learning app to effectively demonstrate heat transfer principles. The final step of testing and debugging plan to identify and resolve potential defects or issues, ensuring the application's functioning and dependability. Make the learning app accessible and user-friendly. The interface design of the game is shown if Figure 1 while Figure 2 shows the students that created the game.



Figure 1: Game Interface Design



Figure 2: From left Nur Anis Natasha Zahurin, Aida Afrina Khusli, Dr. Siti Hidayah Muhad Saleh, Ts. Dr. Ratna Zuarni Binti Ramli, Nur Anis Izzati Abdull Razak

REFERENCES:

- [1] Kr Singh, S., Choudhury, S., & Dora Nongrum, B. (2019). Low achievement in mathematics, a case study of schools of east khasi hills, meghalaya: A survey. 56 *International Journal of Mathematical Education*, 1, 45–56. <http://www.ripublication.com>
- [2] Risnawati, Amir, Z., & Wahyuningsih, D. (2018). The development of educational game as instructional media to facilitate students' capabilities in mathematical problem solving. *Journal of Physics: Conference Series*, 1028(1). <https://doi.org/10.1088/1742-6596/1028/1/012130>
- [3] Kartika, Y., Wahyuni, R., Sinaga, B., & Rajagukguk, J. (2020). Design adventure education mathematics game to improve the ability of creative thinking in mathematics. *International Journal for Educational and Vocational Studies*, 2(12). <https://doi.org/10.29103/ijevs.v2i12.3475>
- [4] Cruz, B., Marchesini, P., Gatto, G., & Souza-Concilio, I. (2018). A mobile game to practice arithmetic operations reasoning. *IEEE Global Engineering Education Conference, EDUCON*, 2003–2008. <https://doi.org/10.1109/EDUCON.2018.8363481>