

## THERMAL PHYSICS GAMES USING WORDWALL

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### ABSTRACT

Physics lecturers typically teach using the traditional method, in which they pose questions to the students in the class at each tutorial session and ask them to complete them in the allotted time. This method can cause students to become bored and disengaged in class. To address this issue, 39 pre-diploma in science students from groups PD0071A1 and PD0071B2 at UiTM Cawangan Negeri Sembilan, Kuala Pilah Campus were introduced to Wordwall, an online educational game. The activity consisted of a review of the topic thermal physics, with students required to answer 15 questions, with their scores displayed on the leaderboard after the session. The students' perceptions of their learning experience, motivation to learn Physics, and expectations were reflected by the ratings collected from their survey responses. According to the findings, 93.8% of students agreed that learning Physics through digital resources was interesting, and 81.3% preferred using Wordwall gamification tools in class over traditional methods. Furthermore, 75% of them agreed that using Wordwall as a teaching aid motivates them to understand the topic thermal physics and increases their engagement in the classroom since the implementation of open and distance (ODL) learning this semester. It makes the class more interactive and learning more enjoyable.

**Keywords:** Physics, pre-diploma, online game, engagement, learning

### 1. INTRODUCTION

In an era disrupted by the Covid-19 pandemic, the development of educational tools that are compatible with remote learning has become a critical approach, as millions of students practice social distance to keep the virus from spreading [1]. The situation has also posed a challenge to UiTM's education system, forcing lecturers to shift from traditional face-to-face classrooms to virtual learning. Previously, physics subjects were taught in a traditional way, with lecturers giving practice questions to students during tutorial sessions and discussion were carried out in class. The activities are not interactive, and students may find the physics subject tedious due to the theoretical and application concepts involved. Therefore, this may lead to poor engagement and poor performance towards learning physics under a flipped classroom.

The use of new technologies enables the teaching learning process to be more dynamic, interactive, contextualized and closer to students' reality [2]. According to Ferdiana (2020), various learning media implemented by lecturers during the pandemic increased the use of digital technology that is integrated into the entire student learning experience [3]. During the pandemic, it is expected that the use of various learning media will increase student motivation in meaningful teaching and learning, resulting in better learning outcomes. One method for ensuring that students understand lecture material is to use online media or e-learning-based media. There are some web tools that are frequently used by the lecturers such as Kahoot, Quizizz, Quizlet and others. The purpose of this study is to design and develop digital online games with gamification elements that will be used for physics revision, specifically in the topic Thermal Physics. Therefore, Wordwall was chosen for the purpose as it includes gamification elements such as a timer, score, and leaderboard. Furthermore, it is user-friendly because students can access the platform without having to sign up.

## 2. MATERIAL AND METHOD

Wordwall is a web-based educational game that is still infrequently used. This game can be accessed at any time and from any location using a laptop or smartphone. There are 18 game options available, including Match Up, Quiz, Wordsearch, Flip tiles, True or False, and many more. The templates are chosen based on the type of activity that the instructor wishes to create. In this study, the Game Show

Quiz template was used, which allows for the creation of a multiple-choice quiz with time constraints, lifelines, and a bonus round. Figure 1 shows the screenshots of the physics game shown on Word Wall.

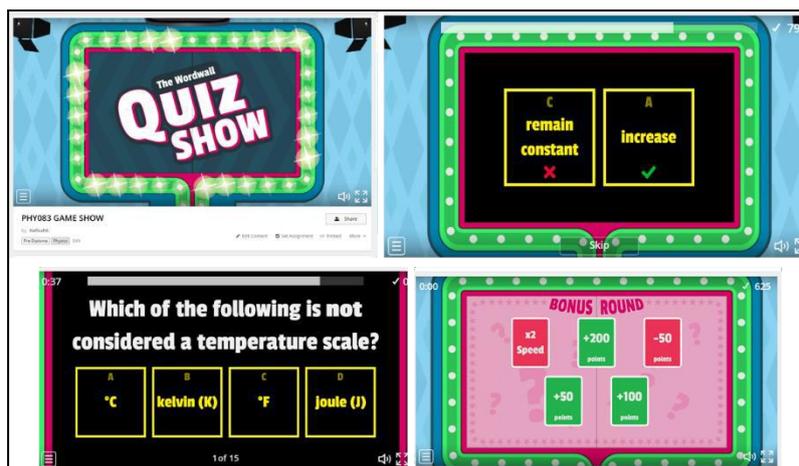


Figure 1: Screenshots of Physics Game Show on Word Wall.

The activity was carried out with the participation of 39 students from the Pre-diploma in Science programme at the Kuala Pilah campus, specifically from classes PD0071A1 and PD0071B2. Before the session began, the instructor used the Google Meet platform to give a briefing about the game and shared the Word Wall link with the students. The game was designed with 15 questions related to the topic of thermal physics, with 45 seconds allotted to answer each question. Students will be awarded extra points for each correct answer; however, if their answer is incorrect, the correct answer will be displayed immediately after the question concludes. After they have answered five questions, a bonus round will appear in which their luck will be tested. The student's performance will be visualized at the leaderboard score, which will rank the students based on their points. After the session, the students' perceptions of the learning experience, motivation, cognitive development, and expectations were analyzed using a survey form distributed to them.

## 3. RESULTS AND DISCUSSION

The survey was successfully completed by 32 pre-diploma in science students from groups PD0071A1 and PD0071B2 to investigate the efficacy of Wordwall as an alternative game-based platform for improving students' understanding of Thermal Physics. It was discovered that 62.5% of the students were female as opposed to male. The questionnaire was developed systematically in order to collect empirical data on the effectiveness of Wordwall as educational digital games in terms of perceptions and acceptance. All items in the questionnaire were measured using the Likert scale showing '1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree'.

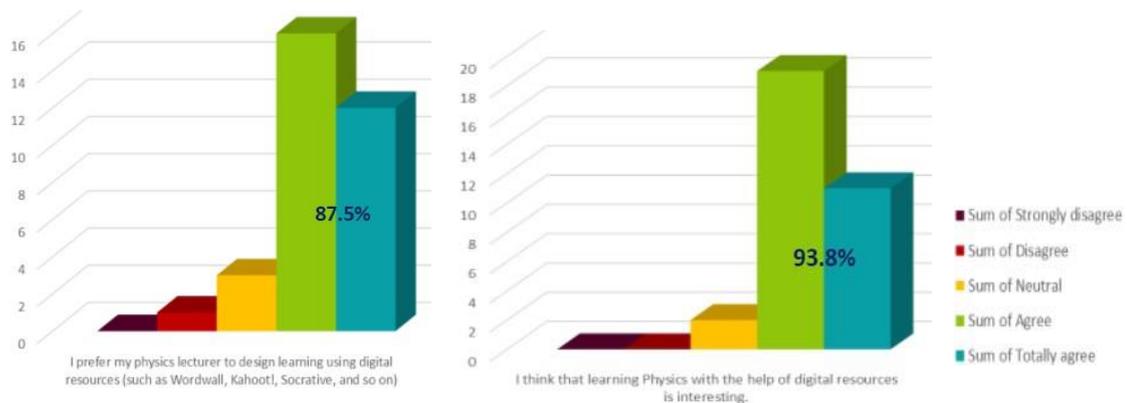
### A) Students' Learning Experience

Graphs on Figure 2 show the results of the students' responses to the learning using digital resources. Overall, 87.5% of respondents agreed and strongly agreed with the use of digital resources in learning

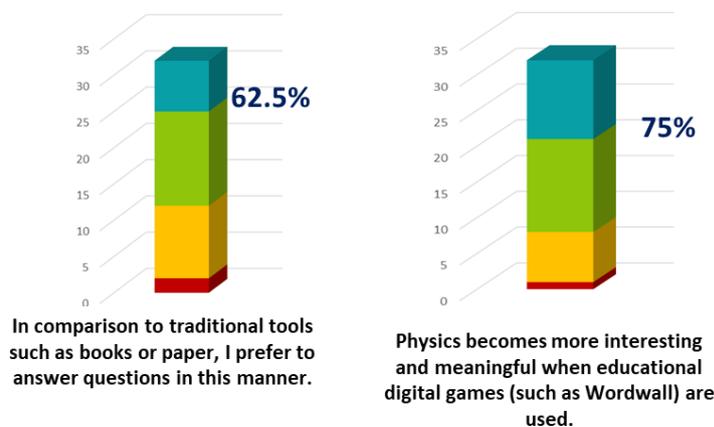
Physics, while 93.8% agreed and strongly agreed that using digital resources makes Physics more interesting.

*B) Students' Motivation in Physics*

According to Figure 3, 75% of respondents agreed and completely agreed that using Wordwall improved students' motivation, understanding of Thermal Physics topic, and desire to study. The use of educational digital games by lecturers during revision improves their engagement in study physics. To summarise student motivation for using Wordwall, according to Figure 3, 62.5% of respondents agreed and strongly agreed that answering questions on Wordwall was preferable to traditional tools such as books or paper.



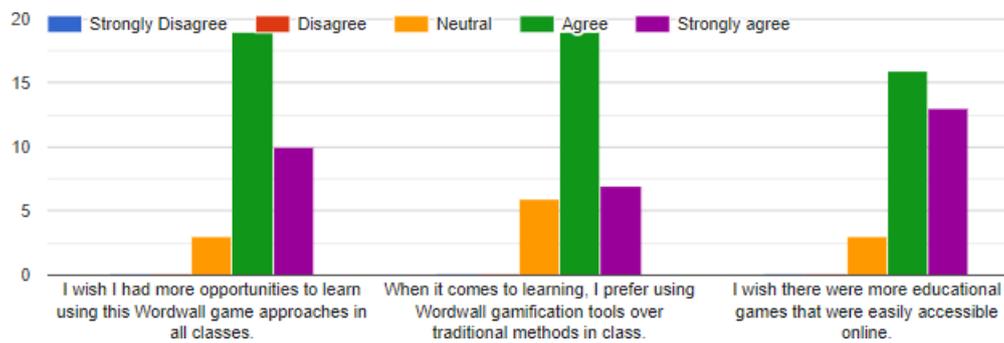
**Figure 2 : Percentage of students' learning experience using Wordwall**



**Figure 3 : Percentage of students who are motivated to study Physics after playing Wordwall educational digital games.**

*C) Students' Expectation of Using Wordwall*

According to Figure 4, more than 80% of respondents expected to have more opportunities to learn using Wordwall in other classes as well. Furthermore, they preferred using Wordwall gamification tools in class over traditional methods because the Wordwall is easily accessible online to support teaching and learning activities



**Figure 4 : Percentage of students' expectation towards Wordwall as teaching and learning aid.**

#### 4. CONCLUSION

Based on the findings, the study concludes that the majority of pre-diploma in science students strongly agreed with the effectiveness of Wordwall as an educational digital game in learning Thermal Physics. Students also believed that Wordwall could increase their motivation to learn Physics in general, which provides educators with insight into how to diversify their teaching and learning methodologies.

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