



International Teaching Aid  
**Competition 2023**

Reconnoitering Innovative Ideas in Postnormal Times

**iTAC**

**2023**

**iTAC 2023**  
**INTERNATIONAL TEACHING AID COMPETITION**  
**E-PROCEEDINGS**

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## **PREFACE**

iTAC or International Teaching Aid Competition 2023 was a venue for academicians, researchers, industries, junior and young inventors to showcase their innovative ideas not only in the teaching and learning sphere but also in other numerous disciplines of study. This competition was organised by the Special Interest Group, Public Interest Centre of Excellence (SIG PICE) UiTM Kedah Branch, Malaysia. Its main aim was to promote the production of innovative ideas among academicians, students and also the public at large.

In accordance with the theme "Reconnoitering Innovative Ideas in Post-normal Times", the development of novel ideas from the perspectives of interdisciplinary innovations is more compelling today, especially in the post-covid 19 times. Post-pandemic initiatives are the most relevant in the current world to adapt to new ways of doing things and all these surely require networking and collaboration. Rising to the occasion, iTAC 2023 has managed to attract more than 267 participations for all categories. The staggering number of submissions has proven the relevance of this competition to the academic world and beyond in urging the culture of innovating ideas.

iTAC 2023 committee would like to thank all creative participants for showcasing their innovative ideas with us. As expected in any competition, there will be those who win and those who lose. Congratulations to all the award recipients (Diamond, Gold, Silver and Bronze) for their winning entries. Those who did not make the cut this year can always improve and join us again later.

It is hoped that iTAC 2023 has been a worthy platform for all participating innovators who have shown ingenious efforts in their products and ideas. This compilation of extended abstracts published as iTAC 2023 E-Proceedings contains insights into what current researchers, both experienced and novice, find important and relevant in the post-normal times.

Best regards,

**iTAC 2023 Committee**  
**Special Interest Group, Public Interest Centre of Excellence (SIG PICE)**  
**UiTM Kedah Branch**  
**Malaysia**

## **CEM JUEGO VERSION 3.0 : GAMIFICATION LEARNING FOR CIVIL ENGINEERING MEASUREMENT WORKS**

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### **ABSTRACT**

The Construction Industry Development Board Malaysia (CIDB) 2013 has promoted the Civil Engineering Standard Method of Measurement (MyCESMM) to avoid discrepancies and ambiguities in the bill of quantities (BQ) for civil engineering works. Hence, it becomes challenging for students to grasp the knowledge and principles of MyCESMM. Gamification is a new teaching and learning technology that create excellent opportunities for creative approaches to improving knowledge and collaboration among students. The 1<sup>st</sup> and 2<sup>nd</sup> versions of CEM JUEGO board game were introduced to increase engagement, collaboration, and excitement of students in the class as well as developed fun learning for the students and lecturers by upgrading the features of the board game. Therefore, CEM JUEGO version 3.0 attempts to innovate the board game feature by transforming the card game questions into the paperless system using online platforms. This game is played by four (4) players within two (2) hours of time allocation in the class. The students are required to answer all questions

online in the game and evaluation will be done by using the developed rubric. Consequently, this concept of scan and play could contribute to a paperless system while promoting environmental sustainability. CEM JUEGO Version 3.0 has the potential for commercialization among civil engineering beginners as well as other institutions which offer civil engineering courses in teaching and learning. It is hoped that this game will enhance their knowledge in an entertaining and engaging way to interpret the basic principles in measuring stipulated civil engineering works based on the current MyCESMM.

**Keywords:** Gamification, learning, paperless, Civil Engineering Works, measurement

## INTRODUCTION

The Construction Industry Development Board Malaysia (CIDB) 2013 has promoted the Civil Engineering Standard Method of Measurement (MyCESMM) to avoid discrepancies and ambiguities in the bill of quantities (BQ) for civil engineering works. The learning process through lecture notes, reference books, and lecturer guidance is insufficient to entice students to understand the principles of civil engineering measurement works. Hence, it becomes challenging for students to grasp the knowledge and principles of MyCESMM.

Currently, young generations are exposed to current technologies, making conventional ways of learning more difficult. Daniah (2017) mentioned that students nowadays are demotivated and less engaged in the learning process. Educators face new challenges in their classrooms, and they are constantly looking for innovative methods to engage students in their learning. Therefore, the gamification of education can enhance levels of students' engagement as well as improve their skills and optimize their learning (Smiderle, et al. 2020).

Nowadays, gamification in education has led to new techniques of teaching, allowing students to enjoy more interesting lessons with better motivation than those provided by traditional approaches (Westera, 2019). Gamification defined by Deterding et al., (2011) involves incorporating game elements and game mechanics into non-game settings. Legaki et al., (2020) found that gamification may improve classroom engagement by removing boredom from certain exercises and improving student collaboration. Hence, The CEM JUEGO was introduced to increase the engagement, collaboration, and excitement of students in the class.

Abdullah, Sahari and Husain (2014) found that the practice of gamification methods in teaching and learning in engineering courses proved to increase student engagement. According to Normahdiah Sheik Said (2016), gamification in education encourages pupils to solve difficult problems in circumstances such as games and challenges. This will make learning more exciting, dynamic, and engaging. Incorporating game-based and gamification into teaching and learning is an interesting approach to enhancing students learning abilities and skill development through a fun and engaging learning experience (Zaki & Kadri, 2019). To change the culture and promote paperless environments, institutions need to introduce the culture to new methods of viewing, reading, and transiting information and learning content (Young,

2002). Therefore, CEM JUEGO version 3.0 attempts to innovate the board game feature by transforming the card game questions into a paperless system using online platforms.

## MATERIAL AND METHODS

### CEM JUEGO Design

CEM JUEGO was adapted from the traditional Snakes and Ladder game due to the effectiveness and timelessness of the game. This game has been innovated to relate to the Measurement of Civil Engineering works course. The 1<sup>st</sup> version and 2<sup>nd</sup> versions of CEM JUEGO board game were introduced to increase the engagement, collaboration, and excitement of students in the class as well as developed fun learning for the students and lecturers by upgrading the features of the board game (see Figure 1 and figure 2). Therefore, CEM JUEGO version 3.0 attempts to innovate the board game feature by transforming the card game questions into a paperless system using online platforms (see Figure 3).

This game is played by four (4) players within two (2) hours of time allocation in the class. Twenty questions have been provided by scanning a QR Code and the students are required to answer all questions online in the game and evaluation will be done by using the developed rubric. Consequently, this concept of scan and play could contribute to a paperless system while promoting environmental sustainability. CEM JUEGO Version 3.0 had been registered with the Intellectual Property Corporation of Malaysia (MyIPO) with the registration number of DV2023W02001.



**Figure 1.** CEM JUEGO Version 1.0



**Figure 2.** CEM JUEGO Version 2.0



**Figure 3.** CEM JUEGO Version 3.0

### Gameplay

CEM JUEGO Version 3.0 consists of 1 main board, 2 dice and 4 counters. A set of rules and regulations are clarified and attached as instructions for all players before start to play (see Figure 4). This game is played by four (4) players within two (2) hours of time allocation in the class. 20 online questions are created and the players could scan the QR Code to choose a question.



Figure 4. CEM JUEGO Version 3.0

## Participants

The participants were Diploma in Quantity Surveying students at UiTM Perak. In total, 351 students aged between 20 and 22 years old were invited to participate in week 9.

## Feedback Questionnaire Design

A questionnaire survey with nine (9) sections was created in Google Forms. After students finished playing the game, they are required to answer all the questions in the questionnaire. This questionnaire survey is to attain the students' perception towards gamification learning for civil engineering measurement works.

## RESULT AND DISCUSSIONS

According to the findings, 60 percent of the participants are female and 40 percent are male students in the Diploma Quantity Surveying program.

## Gamification Learning for Civil Engineering Measurement Works

The following Table 1.0 display the finding from the survey conducted during class after the student completed the CEM JUEGO games.

Table 1: Student Perception towards CEM JUEGO Version 3.0

Item	Mean	Ranking	Item	Mean	Ranking
Section A: Students' Enjoyment Toward CEM JUEGO Version 3.0			Section E: Students' Collaboration/Engagement Toward CEM JUEGO Version 3.0		

A1) I feel genuinely fun	4.8250	2	E1) I feel closer with my friends through this game	4.7583	4
A2) I feel happy when playing	4.8333	1	E2) I learned to work together with my team-mates	4.7917	1
A3) I feel that it is great for killing time productively	4.7333	3	E3) I learned to care about my friends who needed help to understand MyCESMM	4.7833	2
<b>Section B: Students' Engagement Toward CEM JUEGO Version 3.0</b>			E4) I would describe this activity to improve myself confidence in learning MyCESMM	4.7500	5
B1) I wanted to explore all the options because it was very challenging	4.6417	2	E5) I learned to appreciate other people's opinions	4.7667	3
B2) I felt that time passed quickly	4.6083	3	<b>Section F: Students' Expectation Toward CEM JUEGO Version 3.0</b>		
B3) I wanted to complete the game	4.8333	1	F1) I wish I have more opportunities to learn using this game approach	4.7083	1
<b>Section C: Students' Motivation Toward CEM JUEGO Version 3.0</b>			F2) I prefer using games to learn compared to traditional methods in class	4.7000	2
C1) It was important to do well at this task	4.6583	4	F3) I would like to learn all subjects using educational games	4.6500	4
C2) I would describe this activity as very interesting	4.8250	1	F4) I wish these games will be available online for easy access	4.6667	3
C3) I tried very hard on this activity	4.5167	7	<b>Section G: Students' Perception Of Game Interface/Design</b>		
C4) I prefer to answer questions this way compared to using books or paper	4.5917	6	G1) Menus available in the games are easy to understand	4.6917	4
C5) I would describe the questions through online platform is a good tool for learning and easy access	4.8083	2	G2) The concept of scan and play in these games could contribute to a paperless system that help in environmental sustainability	4.8333	1
C6) I am very interested	4.7750	3	G3) Elements in the games are interesting	4.7417	2

in using games for learning the future					
C7) I prefer to do exercises in games rather than quizzes during class	4.6250	5	G4) I just need a very short time to know how the game is functioning	4.6833	5
<b>Section D: Students' Interestedness Toward CEM JUEGO Version 3.0</b>			G5) The use of colour and design layout in the games are interesting	4.7417	2
D1) I enjoyed learning MyCESMM through game	4.7583	2	<b>Section H: Students' Perception of Gamification Learning for Civil Engineering Works Measurement</b>		
D2) I would describe this activity was a new approach to me	4.7083	5	H1) The implementation of game helped me understand the principle in civil engineering measurement	4.6250	3
D3) I feel motivated to learn the game	4.7333	3	H2) The implementation of game made it easier for me to solve civil engineering measurement questions	4.6417	2
D4) I enjoyed the learning	4.7750	1	H3) The implementation of game made me felt the importance of learning civil engineering measurement	4.6250	3
D5) I would like to learn the game	4.7250	4	H4) The implementation of game made me felt the application of the principle in civil engineering measurement in real life	4.6667	1

### Students' Perception Towards Gamification Learning for Civil Engineering Measurement Works

Table 2.0 shows the overall result of each section from the questionnaire survey where each of the sections scored near 5 scales which is STRONGLY AGREED. Therefore, it can be concluded that the CEM JUEGO Version 3.0 is favorable amongst students in learning the Civil Engineering Measurement Work with student's enjoyment of the games scoring the highest, followed in second rank by collaboration engagement and third rank is the student's interest towards CEM JUEGO Version 3.0.

Table 2.0: Overall Student Perception towards CEM JUEGO Version 3.0

Section	Mean	Ranking	Remarks
Section A: Students' enjoyment toward CEM JUEGO version 3.0	4.7972	1	Strongly Agreed

Section B: Students' engagement toward CEM JUEGO version 3.0	4.6944	5	Strongly Agreed
Section C: Students' motivation toward CEM JUEGO version 3.0	4.6857	6	Strongly Agreed
Section D: Students' interestedness toward CEM JUEGO version 3.0	4.7400	3	Strongly Agreed
Section E: Students' collaboration/engagement toward CEM JUEGO version 3.0	4.7700	2	Strongly Agreed
Section F: Students' Expectation toward CEM JUEGO version 3.0	4.6813	7	Strongly Agreed
Section G: Students' perception of game interface/design	4.7383	4	Strongly Agreed
Section H: Students' perception of gamification learning for civil engineering works measurement	4.6396	8	Strongly Agreed

## CONCLUSION

The development of CEM JUEGO Version 3.0 is to provide the best alternative to the students in learning Civil Engineering Measurement Work and improving teaching and learning quality. From the overall results, CEM JUEGO Version 3.0 is favorable amongst students in learning the Civil Engineering Measurement Work with student's enjoyment of the games, encouraging student collaboration and students' interestedness which they enjoyed learning. It reveals that the implementation of gamification in learning can provide better understanding and comprehension for students. More studies should be undertaken to find more innovative, enjoyable, and interactive learning that is best suited to Gen Z students as gamification technologies in education evolve.

## COMMERCIALISATION

CEM JUEGO Version 3.0 has the potential for commercialization among civil engineering beginners or any other institutions which offer civil engineering course in teaching and learning.

## NOVELTY

CEM JUEGO version 3.0 is innovated with more attractive board game features to increase the excitement as well as developed fun learning to the students. The new feature created by transforming the card game questions into paperless system using online platforms helps the students to access faster and more conveniently. Thus, this concept of scan and play could contribute to a paperless system while promoting environmental sustainability.

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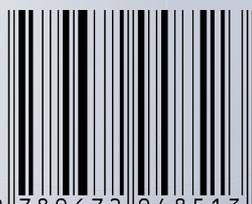


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