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GAMIFICATION TO IMPROVE LEARNERS' LEARNING IN HIGHER EDUCATION

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Abstract: Gamification tools were used to enhance educational activities and are applicable for both traditional and online teaching and learning. The investigation was carried out on the learning challenges for undergraduate students of the Grace International Academy in Punalur, Kerala, India, to learn the subject Introduction to Information Technology. Gamification tools TOGlic, Gimkit, and Bookwidgets were used to improve their specific skills and to enhance their learning. A case study was used as a method in this research. To collect data, questionnaires, observations, and interviews were used as instruments and techniques. The second assessment results show that the performances of students improved. At the end of the semester, a final questionnaire was conducted to find the assistance, effectiveness, and the potential of gamification tools in learning the subject Introduction to Information Technology. The students agreed that the activities conducted through gamification tools were effective, assistive, and had potential in learning the subject. The outcome of gamification tools in learning the subject Introduction to Information Technology reveals that students have improved their attentiveness, escalated their perception, increased their articulation capacity, and made them consolidate the concept of the subject.

Keywords: Gamification tools, Higher Education, Information Technology

Resumo: As ferramentas de gamificação foram usadas para aprimorar as atividades educacionais e são aplicáveis tanto para o ensino e aprendizagem tradicional quanto para o online. A investigação foi realizada sobre os desafios de aprendizagem para alunos de graduação da Grace International Academy em Punalur, Kerala, Índia, para aprender a disciplina de Introdução à Tecnologia da Informação. As ferramentas de gamificação TOGlic, Gimkit e Bookwidgets foram usadas para aprimorar as suas habilidades específicas e oseu aprendizado. Um estudo de caso foi utilizado como método nesta pesquisa. Para a coleta de dados, questionários, observações e entrevistas foram utilizados como instrumentos e técnicas. Os resultados da segunda avaliação mostram que o desempenho dos alunos melhorou. No final do semestre, foi realizado um questionário final para averiguar o apoio, a eficácia e o potencial das ferramentas de gamificação na aprendizagem da disciplina Introdução à Tecnologia da Informação. Os alunos concordaram que as atividades realizadas por meio de ferramentas de gamificação foram eficazes, assistenciais e com potencial para o aprendizado da matéria. O resultado das ferramentas de gamificação naaprendizagem da disciplina Introdução à Tecnologia da Informação revelaque os alunos melhoraram a sua atenção, aumentaram a sua percepção, aumentaram a sua capacidade de articulação e os fez consolidar o conceito do assunto.

Palavras-chave: Ferramentas de Gamificação, Ensino Superior, Tecnologias da Informação

This research is part of the first authors' Ph.D. project on Gamification in Higher Education to motivate learners and develop their creative thinking. The use of educational games as learning tools is a promising approach based on their abilities to teach and reinforce not only knowledge but also important skills such as problem-solving, collaboration, and communication (Dicheva, Dichev, Agre, & Angelova, 2015). The term "gamification" approach suggests using game thinking and game design elements to improve learners' engagement and motivation.

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The inclusion of gamification or game-based curriculum in pedagogy can give effective results in teaching children. Gamification tools have remarkable motivational power in education, the tools utilize a number of mechanics and dynamics to encourage and engage students in learning even without any reward, it make students play just for joy and enable them to win (Dicheva, Dichev, Agre, & Angelova, 2015).

Gamification in education is a strategy for increasing engagement by adding game elements into an educational environment (Smiderle, 2020, as cited in Dichev, 2017). “Gamification techniques are commonly used in higher education to increase learners’ motivation and engagement in a learning task” (Alomari, Al-Samarraie, & Yousef, 2019). In the context of higher education, game-like simulations can be a maximum advantage in any discipline to reinforce the real world’s applications of concepts for students to think critically in order to solve problems (Arnold, 2014). As a research, gamification tools (Kahoot!, Socrative, Showbie, Quizlet, and Quizizz) were already introduced for the senior students of the Grace International Academy for the subject Business Mathematics. It influenced the students well and found that the Gamification is very effective, interesting, useful, enthusiastic, and made them abreast of the situation (Lawrance, Moreira, & Santos, 2021).

The study was focused on the students of the first-year bachelor of commerce program of the Grace International Academy in Punalur, Kerala, India, for learning the subject **Introduction to Information Technology**. We are very well aware of the present situation around us and the whole world is in grip of a catastrophe caused by COVID 19. It affected us in all walks of our life including education. Day by day the technologies are thriving rapidly. Now almost all the schools and colleges are well equipped with high-tech equipment. In the context of online education, gamification plays a logical starting point from text farming to gamified engagement using the technology with an interactive interface, expectations and familiar metaphors are all in place for an optimal smooth transition (Arnold, 2014). So it is very essential to leave our quaint notion of pedagogy and introduce modern technologies in the teaching field to confront the challenging situation and make the students competent.

The tools TOGlic and Gimkit are gamification tools that were tentatively introduced for the students of the first year in the Grace International Academy revealed a salient result. A case study was used as a method in this research. Qualitative and quantitative research tools were used to collect data. A class test was conducted from the first chapter as a diagnostic test to examine students’ proficiency in learning. Questionnaire one was conducted to analyze students’ interest in learning the subject Introduction to Information Technology and the usage of Gamification tools (TOGlic and Gimkit) in activities. Based on the results, a new method of teaching and learning was planned, designed, and implemented. Advancements in mobile technology-enabled students to expand further opportunities in playing games, allow them to participate and engage in any time and any place, students who own a smartphone can become a gamer (Arnold, 2014).

At the end of the semester, a second class test and questionnaire two were conducted to find the performance of students and the usage of gamification tools. The results showed that the students have improved their performance in learning and they agreed that the effect of Gamification in learning the subject Introduction to Information Technology is excellent. The opportunities for experiential, self-paced, and lifelong learning have increased when the concept of gamification is applied to education, where learners are captivated by fun and they were rewarded with knowledge and skills (Arnold, 2014).

GAMIFICATION TOOLS TOGLIC, GIMKIT AND BOOK WIDGETS

TOGLIC -TOGETHER LEARN IN CLASSROOM

According to (Meyerova, 2020)TOGlic is the perfect assistant for teachers. It is simple, intuitive and easy to motivate students. This makes students enthusiastic and this work can be done team-wise as well as individually. TOGlic stimulates students in the use of technology in classrooms for all age groups (Jánošíková, 2020). TOGlic has 16 great activities such as **Working with numbers** (Random Number, Comparisons, Addition and subtraction, Multiplication and division and Bingo), **Working with words** (Words and Sentences, Random letter, Word games, Word games PLUS, Words Bingo and Crossword), and **Cross-sectional activities** (Split into groups, Quick Question, Text content, Web content, and Jigsaw Puzzle). In TOGlic, working with words category of tools were more often used for the subject Introduction to Information Technology to design activities.

GIMKIT

Gimkit is an interactive game for students and teachers. Students gain money by answering correct answers, which allow them to purchase upgrades like power-ups, or themes to enhance their gameplay (Feinsilber, 2021). To create “kits” (live learning games), teachers can select the language and choose any options as shown below.

> **Add questions** - teachers can choose multiple choice or text input in the form of a sentence, picture, and audio with answers.
> **Create Flashcards** - this allows teachers to create flashcards in the form of question and answer or term and definition or teachers can import flashcards from any websites or the Quizlet tool.
> **KitCollab** - this allows students to create the kit! Once students join the game, they can submit a question to be added. The teacher can accept or reject the question that comes in; later the game can be played with the kit made by students.
> **Question Bank** - teachers can pick a kit from the question bank in the Gimkit based on their topics.

Gimkit enables teachers to view reports in the form of a **Student overview** – it shows the number of correct, incorrect answers and the percentage scored individually. **General overview** - it shows collecting balance, correct and incorrect answers, and the overall percentage. **Question Breakdown** - it shows number of correct and incorrect answers of each question and the percentage score for the correct answers. Gimkit tool was used to conduct class tests for the subject Introduction to Information Technology.

BOOK WIDGETS

It is easy to use platforms for teachers to create interactive activities. It has 40 + activity templates more related to games like crossword riddles, bingo sheets, memory games, and much more. It enables teachers to monitor student activity in real-time and allows them to help those who are struggling in their activity. Many activities are graded automatically and provide information that needs to determine in the activity. It connects with Google classroom, Microsoft Teams for Education, Moodle, Canvas, or Schoology. Some of the activities of Book Widgets like Crossword, Word search, Bingo card, and Memory game widgets were used to conduct activities for the subject Introduction to Information Technology. According to (Tronçon, 2016) the crossword in Book widget can be used for any subject, and it always entertains the class. In the memory game widget, recognizing a pair gives more insight into relationships between the terms than memorizing (Buckinx, 2017).

METHODOLOGY

This research was conducted for the first semester students of the Grace International Academy for Bachelor of Commerce in learning the subject Introduction to Information Technology. The research study was planned and scheduled from December 2020 to May 2021. A case study was used as a method in this research. Qualitative research tools (educational values, attitudes, opinions, feelings, behavior of students in classrooms, interviews, and discussions) and quantitative research tools (classroom observations, questionnaires, and class tests) are used as instruments/techniques to collect the data.

As the continuation of lockdown due to the COVID 19 pandemic, Schools and Colleges are still in the mode of online teaching. To begin with the Subject - Introduction to Information Technology for the first semester students, a collaborative mind-mapping web application tool **Coggle** was used to give an overview of the Subject Module on 7th December 2020. It allowed mapping the units of computer, types of hardware, and its functions and shared them with the students using Google meet with a screen sharing option. Coggle is freeware, it allows students to do collaborative works and can create unlimited maps related to the topics. It saves the maps automatically in Google drive and enables them to contribute their ideas in the form of maps.

Building a dynamic collaborative classroom with creativity is essential in online teaching and learning. The **Padlet** tool was introduced, which is a web-based application tool that allows students to post notes on a digital wall, it is a similar activity to “write a sticky note and put it on the wall”. Padlet was used to demonstrate and explain the topic “History and Development of Computers” on 18th December 2020. The students contributed their content and pictures of subtopics through the WhatsApp tool, which enabled me to correct and place the content on the Padlet Wall and shared the screen with the students through Google Meet.

(Make a Padlet, 2020) allows us to make our screen as a **Wall** to pack content in a brick-like layout, **Canvas** to connect scattered or grouped content in our way, **Stream** to streamline the content in an easy to read and top to bottom approach, **Shelf** to stack content in a series of columns, **Backchannel** to communicate the content in a chat-like environment, **Map** to add content to the points of the map, and **Timeline** to place content along a horizontal line. Padlet was used in several online sessions as a platform to explain the topics such as Computer generations and History of Famous Computer Scientists, which enabled to create a collaborative online classroom with creativity.

On completion of the first Module (Fundamentals of Computer Technology), a class test was planned and conducted on 15th January 2021 to test students’ knowledge in learning. The test was designed as a diagnostic test, to know the students’ proficiency in the articulation of technical terms in technology and its importance. Out of fourteen students, only twelve students attended the test, for absentees zero marks were awarded. The class test marks reflected that 57% of students scored below 50% of marks as shown in table-1 below.

First Module - Class Test 1			
Si.No	Students	Marks (out of 40)	Percentage

1	Student A	0	0%
2	Student B	0	0%
3	Student C	4.5	11%
4	Student D	7	18%
5	Student E	11	28%
6	Student F	11.5	29%
7	Student G	15	38%
8	Student H	18.5	46%
9	Student I	20	50%
10	Student J	21	53%
11	Student K	21	53%
12	Student L	22	55%
13	Student M	28	70%
14	Student N	29	73%

TABLE 1: FIRSTCLASS TEST MARKS

The answer sheet shows that students are able to understand the fundamentals of computer technology, but they are not able to articulate in a proper way of using correct spellings with grammar.

In a PTA (Parent-Teacher Association) meeting, some of the parents pointed out that their children are not able to understand technical terms, as they are not conversant with the mode of communication in English through online classes. This is a main challenge for the students who are from the schools where they are using their mother tongue as a medium of communication. In spite of this, some of the students are from rural areas whose parents are not very literate and cannot provide them with sufficient guidance.

A pattern of question paper (University, 2013) for the annual written examination of undergraduate students of Kerala University is given in table 2 below.

University of Kerala Written Examination - Question pattern				
Question type	Total number of Questions	Questions to be answered	Marks for each Questions	Total Marks
Section A (Short answers)	10	10	1	10
Section B (Paragraph)	12	8	2	16
Section C (< 120 words)	9	6	4	24
Section D (Long essay)	4	2	15	30
	35	26		80

TABLE 2 QUESTION PATTERN FOR WRITTEN EXAMINATION

Recently I got an opportunity to evaluate the answers sheets of 75 students of the University of Kerala for the Subject Business Mathematics. The same subject I taught for the students of Grace International Academy for the academy in the year 2019. In the evaluation of answer sheets, I

understood that the majority of students are not able to answer appropriately to the question. At the same time it is found that some of them have repeated the answers where it was not necessary. The final result of the evaluation of the answer sheet revealed that only 30% percent of the students could score 26 marks and above, where as 26 marks out of 80 are the minimum marks required to pass.

The above factors such as **class test results, parents' feedback,** and **answer sheet evaluation experience** enabled me to plan and organize a new methodology in teaching and learning the subject Introduction to Information Technology. The following method was planned and implemented in teaching and learning the subject to improve learners' results.

1) Mode of Interaction to students in both English and Mother tongue (Malayalam).
2) Explain the topic and address questions and answers in the view of examination.
3) Introduce and implement Gamification tools to improve learners' motivation.

The gamification tool TOGlic was introduced to students on 27th January 2021 with an activity of **CROSSWORD** in Module 1 (Fundamentals of Computer Technology). This enabled using the tool to teach vocabulary, technical spellings, and definitions in the subject "Introduction to Information Technology". Students were expected to learn and memorize the technical words and its definitions without spelling mistakes.

To learn and improve sentence framing skill, an activity was planned and designed using TOGlic (Words and Sentences) and conducted on 1st February 2021. It is an activity to arrange disorderly given words, sentences segments, and phrases to make meaningful sentences. As soon as the students frame the sentence, it will be displayed on the teacher's device with a tick mark if the answer is correct. But the tick mark will not be available on their devices, and the students are not in a position to justify whether the answer is correct or wrong. This is one of the challenges that we face when we conduct the activities online. To overcome such challenges, the teacher has to interact with students through Google meet by sharing the screen with students, at the same time the teacher can also give verbal instructions specifying a particular student who has not corrected their sentences. Using this method we can continue this activity to check, correct, guide, and verify the answers one by one. This activity enabled students to develop their skills in framing the sentences.

An online activity as a revision for the module – Chapter Number System was planned and conducted on 3rd February 2021 using **Gimkit tool**. It is an interactive game tool for students to earn money by answering correct answers, where each answer has a cash award. Using this money they can purchase upgrades like power-ups, or themes to enhance their gameplay.

There are three options in this game activity such as, time option, race option and all in option. The teacher can choose the activity as per teacher's choice. Setting the game in **time option** for specified minutes, students can earn money, as much as they get correct answers before the time runs out. 10 minutes time option was set in this revision activity, and the answer check option was also activated for students to view the correct answer. This enables students to learn and answer correctly when the question repeats in the given time limit. The outcome of the activity reflected that the students were able to score in the range of 65% to 100%.

In the **race option** setting, the students race among themselves to reach the GimCoin goal, which is the price amount set by the teacher. **All In option** – In this game activity there is no time limit to answer the questions. For every answer the student can earn one dollar for correct answer. If

the answer is wrong, the correct answer will be displayed on the screen immediately and the student will be awarded with a minus one dollar, and students won't be able to go below certain cash amount (minus 50 dollar) and the game will continue with a next question. In this activity an initial amount of cash goal is already set in the game and the game will end only when the amount is earned among them through the game.

Questionnaire one was planned and designed using research questions with research objectives and conducted on 4th March 2021, to examine students' interest in learning the subject Introduction to Information Technology and the usage of Gamification tools (TOGlic and Gimkit) in activities.

RESEARCH ASSERTIONS

1) The subject supports the specific interests of my life.
2) The Lecturer provides me with the right information to perform the task adequately.
3) The subject is intellectually challenging.
4) The tools TOGlic and Gimkit encourage active participation in learning.
5) The tools TOGlic and Gimkit motivate me to learn the subject.
6) I am benefiting from the usage of the tool TOGlic and Gimkit in learning.
7) I am pleased and willing to use TOGlic and Gimkit in learning.

RESEARCH OBJECTIVES

1) To assess skill development by learning the subject.
2) To identify and describe guidance from the lecturer.
3) To test if the subject is intellectually challenging.
4) To collect evidence of student participation using TOGlic and Gimkit.
5) To identify motivation in learning using TOGlic and Gimkit.
6) To assess students learning with the help of the tools TOGlic and Gimkit.
7) To determine the practice of the tools TOGlic and Gimkit for learning.

An ordinal scale was used in the questionnaire for the ratings of quality. The Likert scale measures were assigned with values Strongly Disagree (SD) -1, Disagree (D) -2, Neither Agree Nor Disagree (NAND) -3, Agree (A) – 4, and Strongly Agree (SA) -5 and the questionnaire data was counted and represented in the table3.

LikertScale	Q1	Q 2	Q3	Q4	Q5	Q6	Q7
SDA ->1	0	0	0	0	0	0	0
DA-> 2	0	0	1	0	0	0	0
NANDA->3	0	0	4	0	0	1	0
A->4	10	2	7	6	4	6	5
SA->5	5	13	3	9	11	8	10

TABLE 3 LIKERT SCALE VALUES AND QUESTIONNAIRE 1 DATA

To identify the category for each question in the Likert scale, data of each question was added to find cumulative responses, using cumulating responses data, the median was calculated using

the formula (n+1)/2 that is (15+1)/2 = 8. This was used to find the category, which falls in cumulative responses and this was considered as the median.

Below shows the summary report of objectives with category after finding the median.

1)To assess skill development by learning the subject. - **Agree**
2)To identify and describe guidance from the lecturer. – **Strongly Agree**
3)To test if the subject is intellectually challenging. - **Agree**
4)To collect evidence of student participation using TOGlic and Gimkit. – **Strongly Agree**
5)To identify motivation in learning using TOGlic and Gimkit.- – **Strongly Agree**
6)To assess students learning with the help of the tools TOGlic and Gimkit.– **Strongly Agree**
7)To determine the practice of the tools TOGlic and Gimkit for learning. – **Strongly Agree**

Students agreed on the subject “Introduction to Information Technology” because it supports their specific interest of their life and it is intellectually challenging. They strongly agreed on the Gamification tools (TOGlic and Gimkit) as they encourage and motivate them in active participation in their learning. They are also benefiting and willing to use these tools in their learning activities.

Two activities were planned and conducted on 15th March 2021 to test student's knowledge in the first three modules of the subject Introduction to Information Technology. Gimkit tool was used in the form of short answers and multiple-choice questions for the topic types of hardware in module one and it was observed that the students were able to use their currency to double their scores.

The results show that they are above 81% of accuracy in their performance. In TOGlic, Words bingo tool was used to design the activity for the modules two and three; a quick response of students was observed in answering the questions and they were able to form the Bingo horizontally, vertically, or diagonally.

Bingo Card Game in Book Widgets was planned and conducted on 23rdand 26th March 2021 for the module-3 “Different types of Hardware”. In this game activity every student gets a card having words in a different order, when the teacher calls out a word the student has to search for the right word and mark it. The student who has marked all the words in row or column first, yells “Bingo”, and wins the game. It was observed that during the game activity, students have fun in identifying the word and marking.

To make the game activity in the learning perspective, questions were asked related to the word given to them. This enabled them to answer the question related to the word and its definition or its application. The students who answered correctly were awarded with half a mark internally. This newly adopted technique escalated their interest in participation in the game. Table 4below shows the performance of the students in the Bingo Card Game.

Bingo Card Game -Score Board

		Half mark for every correct answer						
Si No	Student Name	Activity 1			Activity 2			Game Score
1	Student A	0.5	0.5	0.5	Ab	Ab	Ab	1.5
2	Student B	0.5	0.5	0.5	0.5	0.5		2.5
3	Student C	0.5	0.5	0.5	Ab	Ab	Ab	1.5
4	Student D	0.5	0.5		0.5			1.5
5	Student E	Ab	Ab	Ab	0.5			0.5
6	Student F	0.5	0.5		0.5			1.5
7	Student G	0.5	0.5	0.5	0.5	0.5		2.5
8	Student H	Ab	Ab	Ab	0.5			0.5
9	Student I	0.5	0.5	0.5	0.5	0.5	0.5	3
10	Student J	Ab	Ab	Ab	0.5	0.5		1
11	Student K	0.5	0.5	0.5	0.5	0.5		1.5
12	Student L	0.5	0.5	0.5	0.5	0.5	0.5	3
13	Student M	0.5	0.5		0.5			1.5
14	Student N	0.5	0.5		0.5	0.5		2

TABLE 4 STUDENTS SCORE IN BINGO CARD GAME

The above score board shows the marks of students who took initiate to answer the question. The first activity was conducted on 23rdmarch 2021 and the second on 26th March 2021. The score board reflects that every student got an opportunity to answer the question. Hand rising technique was used for students to answer the question. Good participation and engagement of students were observed in these activities.

Several activities were conducted using TOGlic, Gimkit and Book Widgets as a part of revision for chapters 3, 4and 5. The students performed well in all activities as they are familiar with these tools. Apart from the Gamification activities in Book widget, interactive assessments can also be conducted, in which one of the activity is Quiz. It enables to create assessment with more than 30 patterns of questions in which short answer questions and essay type questions are available. An assessment was designed and conducted on 15th April 2021 using Quiz in Book Widgets for 30 marks with two marks for each short answer questions. This assessment was planned to award them internal marks for the subject as well as to assess their sentence framing and spelling skills, and to check their performance in learning the module Introduction to Information Technology.

This assessment was conducted as second class test in the form of a public examination model with one hour time limit. Students performed the test well using their mobile phones. The interface of the Quiz in Book Widgets is user friendly, and they are familiar with this tool by doing several activities in the classroom and at home. The results of the first class test along with the second class are depicted in table 5 below.

		First Class Test	**Second Class Test**

Si No	Students	Marks (out of 40)	Percentage1	Marks (out of 30)	Percentage2
1	Student A	0	0%	24	80%
2	Student B	0	0%	30	100%
3	Student C	4.5	11%	28	93%
4	Student D	7	18%	30	100%
5	Student E	11	28%	25	83%
6	Student F	11.5	29%	17	57%
7	Student G	15	38%	26	87%
8	Student H	18.5	46%	24	80%
9	Student I	20	50%	27	90%
10	Student J	21	53%	28	93%
11	Student K	21	53%	22	73%
12	Student L	22	55%	27	90%
13	Student M	28	70%	28	93%
14	Student N	29	73%	28	93%

TABLE 5 COMPARISONS OF CLASS TESTS MARKS

First and second class tests were conducted in the beginning and end of the semester to find the performance of the students in learning the subject Introduction to Information Technology.

Based on the performance of the first class test, a new teaching methodology was adopted with Gamification tools to improve their learning skills in the module and it has reflected in the second class test as shown in table 5. The minimum percentage of marks scored is 57 and the maximum score is 100 percent. To make clear perception of students' performance, table 5 was converted into a bar chart as shown below.

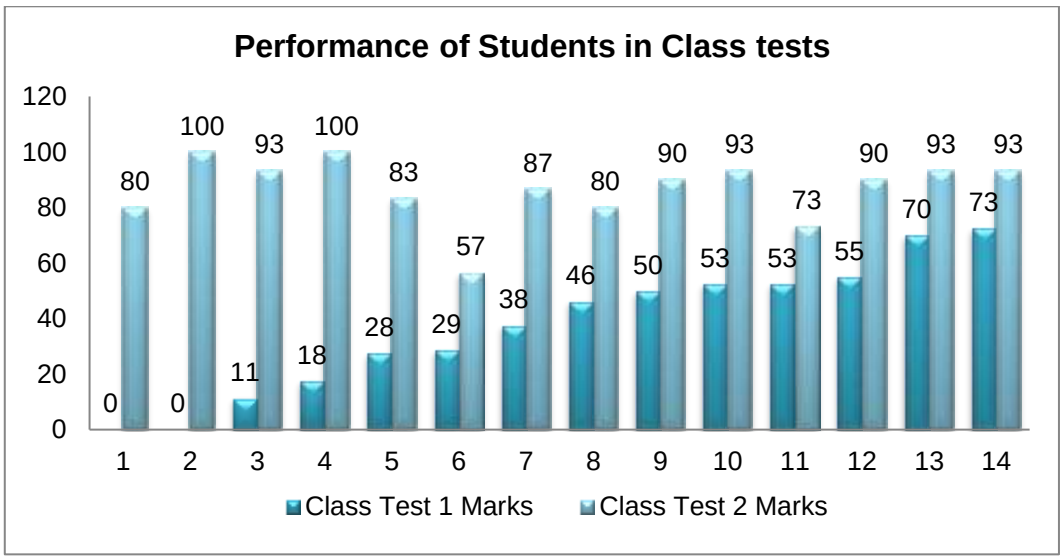

CHART 1 STUDENTS PERFORMANCE IN CLASS TESTS

The chart shows an escalation in the marks of every student from the first class test to the second class test. This shows the improvement of students' performance in learning the module

Introduction to Information Technology. To find the measures of central tendency and the spread of marks in the class test 1 and class test 2, software package in social science (SPSS) was used to summarize the data of students' performance as shown below table 6.

Descriptive Statistics of Class Test Marks

	Class Test 1	Class Test 2
N	14	14
Minimum	.00	56.67
Maximum	72.50	100.00
Range	72.50	43.33
Mean	37.2321	86.6667
Median	41.8750	90.0000
Std. Deviation	23.77367	11.54701

TABLE 6 COMPARISONS OF CLASS TEST RESULTS

The above results of the analysis is based on the students marks, where N = 14 (Number of Students in the class). In class test 1, Minimum mark = 0 and Maximum mark = 72, Range = 72.50 (difference between maximum mark and the minimum mark) Mean = 37.2321, Median = 41.8750 and Standard Deviation (SD) = 23.77367. When we look at the mean of class test 1, it appears to be very low, most students in the class are from a rural area and they had the challenges to adapt with the change of mode from school to college. However, based on the large standard deviation, it looks like the marks vary quite a bit.

In class test 2, Minimum mark = 56.57 and Maximum mark = 100, Range = 43.33, Mean = 86.6667, Median = 90.0000 and Standard Deviation (SD) = 11.54701. When we look at the mean of class test 2, it appears to be high with a low standard deviation, which means most of the marks are spread out closer to the mean.

QUESTIONNAIRE TWO RESULTS AND DISCUSSION

Questionnaire two was applied at the end of the semester with research questions and research objectives of the module Introduction to Information Technology for the first semester students as follows.

RESEARCH QUESTIONS

1) How effective is the game Crossword in improving your spelling of technical terms in the subject Introduction to Information Technology?
2) How does the game "Word & Sentences" support you to frame the sentences?
3) The game "Memory Widget" enables you to recognize or remember the term to match correctly?
4) The "Word Search" game allows you to identify the terms using the given definitions.
5) How would you evaluate the overall game activity experience you have had with the Module Introduction to Information Technology?

RESEARCH OBJECTIVES

1) To find the effectiveness of the game Crossword in learning.
2) To assess the assistance of the game "Word & Sentences" in learning.

3) To identify the potential of the game “Memory Widget” in developing memory skills.
4) To find the effect of the game “Word Search” in recognizing the term of the definition.
5) To evaluate the effect of Gamification tools in learning the module.

Google form was used to collect the feedback from students; an ordinal scale was used in the questionnaire for the ratings of quality. Five scale Likert measures were assigned with values Very Poor -1, Poor -2, Neutral -3, Good – 4, and Excellent -5 for questions 1, 2 and 5. Three scale Likert measures were assigned with values Agree- 1, Neither Agree Nor Disagree-2 and Disagree -3 for questions 3 and 4.Tables7 and 8 show the results.

Likert Scale	Q1	Q2	Q5
Very poor	0	0	0
Poor	0	0	0
Neutral	0	0	0
Good	4	5	0
Excellent	11	9	14

TABLE 7 STUDENTS FEEDBACK FOR QUESTION 1, 2 AND 5

Likert Scale	Q3	Q4
Disagree	3	0
Neither Agree Nor Disagree	0	0
Agree	11	14

TABLE 8 STUDENTS FEEDBACK FOR QUESTION 3, AND 4

The results below show the consolidated summary report for the questionnaire 2 after finding the median for every objective.

1)To find the effectiveness of the game crossword in learning. - **Excellent**
2)To assess the assistance of the game “Word & Sentences” in learning. - **Excellent**
3)To identify the potential of the game “Memory Widget” in developing memory skills. - **Agree**
4)To find the effect of the game “Word Search” in recognizing the term of the definition.-**Agree**
5)To evaluate the effect of Gamification tools in learning the module. – **Excellent**

1) Effectiveness of the game Crossword in learning enabled the students to improve their vocabulary, spelling of words and to connect words with unique clues or definitions and even warm up for students' logical reasoning skills. Students rated this game “Excellent” in learning the module Introduction and Information Technology.

2) Students rated the game Word and Sentences “Excellent”. It enabled them to write appropriate answers to the questions and it developed their sentence framing and communication skills. In the class test 2, the answers were adequate to the questions. It shows that the skill of students improved in spelling and sentence framing.

3) 79% of students agreed that the game “Memory Widget” has the potential to develop memory skills, and 21% disagreed. In the first game activity of memory Widget, the result shows that a few students flipped the cards more often than the others. In discussion with students about the game, they stated that they were playing the game using a trial and error approach. In the second

game activity, clear instructions were given to students to play the game with minimum number of flips, and a better result was shown than in the first activity. This enabled them to improve their memory skills.

4) Word Search Game in Book widgets is one of the interesting games for students to find the hidden words given in diagonal, horizontal and vertical modes.100% of students agreed that the game enabled them to recognize and recollect the correct term based on the clue or the definition given. It is a good exercise for students to improve their ability to recollect and focus concentration.

5) 100% of students stated that the effect of Gamification tools in learning the module Introduction to Information Technology as Excellent. The gamification tools TOGlic, Gimkit, and Book Widgets were used this semester, were appropriate tools for students to learn the module. Several activities were conducted using these tools for various chapters in the module and got salient results.

It was observed in the classroom that the students were extremely attentive while using gamification activities using TOGlic, Gimkit, and Book Widgets, and it influenced them to engage in the game activities. The tools enable them to learn with quick feedback, and it motivates with points and badges and also improves their performance in learning spelling and sentence framing skills. These tools helped them to develop skills in learning as well as escalated their performance in-class tests. All students rated “excellent” in the use of Gamification tools (TOGlic, Gimkit, and Book Widgets) on learning the subject Introduction to Information Technology.

In the context of Higher Education in India, students are allowed to use their mobile phones in colleges/universities and they have their own internet access. This is one of the positive aspects to implement Gamification in Higher Education. Some of the gamification tools have pre-designed activities related to the topics; this is another positive aspect to conduct the activity or to get an idea to redesign the activity in a short span of time.

CONCLUSION

This research study shows that the Gamification tools (TOGlic, Gimkit, and Book Widgets) keep students motivated and helped them to engage in learning. These tools gave significant support to develop and standardize students’ proficiency to perform online learning effectively. These tools were applied in teaching the module Introduction to Information Technology for the first semester students of the Bachelor of Commerce program in the Grace International Academy during the COVID lockdown period. The feedback from the students showed that the usage of the Gamification tools in the learning module was excellent. The review of Gamification and online interactive tools enabled to select appropriate tools and apply them based on their proficiency. The performance of the students also improved in the second class test as compared to the first-class test.

The use of Gamification on Higher Education revealed that it has influenced the students in various aspects. It has improved their attentiveness, escalated their perception, increased their articulation capacity, and made them consolidate the concepts. It also helped to develop their interest in participation in the activity with enthusiasm, spirit, excitement and emotions, which enhanced their performance in learning. However, selection of Gamification tools for education should be based on the content of the subject, learning potential of students and the availability of resources.

REFERENCES

Alexandru,T. (2017). A role-playing approach to increase student in-class motivation. Retrieved from Gamified learning: http://www.sciencedirect.com/science/article/pii/S187705091731356X

Alomari, I., Al-Samarraie, H., & Yousef, R. (2019). THE ROLE OF GAMIFICATION TECHNIQUES IN PROMOTING STUDENT LEARNING:A REVIEW AND SYNTHESIS. *Journal of Information Technology Education* , 396-417.

Arnold, B. J. (2014, January). *Gamification in Education*. Retrieved November 10, 2021, from Researchgate: https://www.researchgate.net/publication/295401531_Gamification_in_Education

Buckinx, B. (2017, 11 June). How to create memory games and pair matching exercises. Retrieved April 11, 2021, from Book Widgets: https://www.bookwidgets.com/blog/2017/06/how-to-create-memory-games-and-pair-matching-exercises

Catherine. (2017, August 24). What role does music play in our life? Retrieved September 9, 2020, from The Creative Music Blog: https://blog.procollabs.com/role-music-plays-life/#:~:text=Music%20is%20an%20important%20part,you%20to%20reduce%20the%20stress.&text=Music%20plays%20a%20more%20important,being%20a%20source%20of%20entertainment.

Christo Dichev, D. D. (2015, October 19). Gamification in Education: Where Are We in 2015". Retrieved June 20, 2020, from Academia: https://www.academia.edu/15628356/Gamification_in_Education_Where_Are_We_in_2015?email_work_card=view-paper

Denny, P. (2013). The effect of virtual achievements on student engagement. Retrieved from http://130.216.33.163/courses/compsci747s2c/lectures/paul/p763-denny.pdf

Dicheva, D., Dichev, C., Agre, G., & Angelova, G. (2015, July). *Gamification in Education: A Systematic Mapping Study*. Retrieved November 10, 2021, from Researchgate : https://www.researchgate.net/publication/270273830_Gamification_in_Education_A_Systematic_Mapping_Study

Feinsilber, J. (2021). Classroom Resources. Retrieved March 16, 2021, from Teachers First-Thinkers Teachers Teaching Thinkers: https://www.teachersfirst.com/single.cfm?id=18346#

Gamification Principles for user engagement. (2016, July 13). Retrieved June 20, 2020, from datagame: http://datagame.io/gamification-principles/

Hanus, M. &. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. . Computers & Education , 152 - 161.

James, N. P. (2015, December 11). Golden Rules for Engaging Students in Learning Activities. Retrieved June 17, 2020, from Edutopia: https://www.edutopia.org/blog/golden-rules-for-engaging-students-nicolas-pino-james

Jánošíková, J. (2020). What users say about TOGlic? Retrieved March 13, 2021, from TOGlic_Together learn in Classroom: https://www.toglic.com/en/

Kris Duggan, K. S. (n.d.). How to Work with Leaderboards in Gamification. Retrieved July 11, 2020, from dummies: https://www.dummies.com/business/customers/how-to-work-with-leaderboards-in-gamification/

Lawrance, P. J., Moreira, A., & Santos, C. (2021). A case study on applying gamification tools in Business Mathematics for Higher Education Students. *Internet Latent Corpus Journal* , 70-81.

Leaderboard. (2017, April 26). Retrieved July 11, 2020, from Computer Hope: https://www.computerhope.com/jargon/l/leaderboard.htm#:~:text=is%20a%20Leaderboard%3F-,Leaderboard,collected%2C%20or%20some%20other%20metric.

Make a Padlet. (2020, January 10). Retrieved March 28, 2021, from Padlet: https://padlet.com/create?back=1

Meyerova, N. (2020). What users say about TOGlic? Retrieved March 7th Sunday, 2021, from TOGlic: https://www.toglic.com/en/

Mohd Hishamuddin Abdul Rahman, I. @. (2019). Academia. Retrieved September 5, 2020, from Academia.edu: https://www.academia.edu/38271954/GAMIFICATION_ELEMENTS_AND_THEIR_IMPACTS_ON_TEACHING_AND_LEARNING_A_REVIEW?email_work_card=view-paper

Sauro, J. (2011, May 10). How to interpret Survey Responses. Retrieved from Mesauring U: https://measuringu.com/interpret-responses/

Smiderle, R. (2020, January 9). The impact of gamification on students' learning, engagement and behavior based on their personality traits. Retrieved April 10, 2021, from Springer Open: https://slejournal.springeropen.com/articles/10.1186/s40561-019-0098-x#citeas

TOGlic. (2020). Retrieved March 13, 2021, from TOGlic_Together learn In Classroom: https://www.toglic.com/en/activity-overview/#words-sentences

Tronçon, R. (2016, November 26). Create Crossword Puzzles for your Classroom. Retrieved 3 19, 2021, from Book Widgets_Interactive Learning: https://www.bookwidgets.com/blog/2016/11/create-crossword-puzzles-for-your-classroom

University, K. (2013). Pattern of Questions. Retrieved Mach 16, 2021, from UNIVERSITY OF KERALA REGULATIONS RELATING TO THE FIRST DEGREE PROGRAMMES IN AFFILIATED COLLEGES: https://www.keralauniversity.ac.in/downloads/regulations_2013.pdf

Vicki, D. (2015). 8 Great ways to level up game based learning in the classroom. . Retrieved from The Coolcat Teacher: http://www.coolcatteacher.com/game-based-learning-in-the-classroom/

Vicki, D. (2015). Fantastic Fast Formative Assessment Tools. Checking for understanding is good for both students and teachers. Retrieved from Edutopia: https://www.edutopia.org/blog/5-fast-formative-assessment-tools-vicki-davis

Why are critical thinking and problem solving essential in today's education? (2018, February 13). Retrieved July 10, 2020, from Acer for education: https://eu-acerforeducation.acer.com/learning-skills/why-are-critical-thinking-and-problem-solving-essential-in-todays-education/