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Original citation & hyperlink:
Durrani, U, Al Naymat, G, Ayoubi, R, Kamal, MM & Hussain, H 2022, 'Gamified flipped classroom versus traditional classroom learning: Which approach is more efficient in business education?'International Journal of Management Education, vol. 20, no. 1, 100595
https://dx.doi.org/10.1016/j.ijme.2021.100595

DOI 10.1016/j.ijme.2021.100595
ISSN 1472-8117
ESSN 2352-3565

Publisher: Elsevier

Gamified Flipped Classroom vs. Traditional Classroom Learning: Identifying the Most Efficient Approach

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Highlights

- Little is known about the effectiveness of management learning when blending flipped classroom and gamification learning approaches.
- Gamification Flipped Classroom (GFC) was found to be more efficient than the traditional learning (TC) approach in terms of complexity, task orientation, student engagement, satisfaction, knowledge, and learning motivation.
- However, TC students achieved better course learning outcomes than the GFC due to perceived content relevance.
- The need to employ mixed learning approaches in classrooms and not solely rely on one approach only.

Abstract

Past studies have shown the efficacy of flipped classrooms and gamification learning approaches. However, we know little about the blend of these learning approaches. This study compares the effectiveness of gamified flipped classrooms (GFC) to traditional classroom (TC) learning approaches. We study two different undergraduate cohorts over six-week course delivery in management and IT in a university in UAE. We collected data through an online survey from 105 students (control and experimental) and performed interviews with two focus groups of students. We identified the GFC learning approach as more efficient in terms of complexity of the technique, task orientation, student engagement, satisfaction, knowledge, and learning motivation. We also found a slight difference between the two approaches in terms of student skill development. Surprisingly, the control group achieved better course learning outcomes through TC than the experimental group using GFC because of perceived content relevance. The study

provides additional evidence on the relevance of employing mixed learning approaches in classrooms, not to rely on one approach of university lecturers and learning enhancement units solely.

Keywords: Gamification, flipped classroom, perceived usefulness, content relevance, ARCS model, online survey, interviews, non-parametric test.

Introduction

The transition from the traditional classroom (TC) learning approach to experimenting with modern technology-facilitated teaching methodologies has been developing since the beginning of the 21st century. Research studies (Lee, 2011; Strayer, 2012; Toqeer, 2013) found that these methodologies had a significant impact on students' academic performance, engagement, motivation, and accelerated learning experience (Chen & Law, 2016; Sung et al., 2017; Bernard & Chaffari, 2019; Casredo et al., 2019; Whitton & Langan, 2019). Game-based learning (GBL) also became trendier in classrooms (Burke, 2016).

From another side, several studies explored the successful implementation of flipped learning (FL) and its positive impact on students' satisfaction and performance (Kim, 2018; Alsaleh, 2020; Ping et al., 2020), however it is still questionable whether this impact differs across different subject area and when blended with gamification given the fact that gamification' highlights the importance of context and individual motivation (Perryer et al. 2016). Therefore, in this paper, we will explore the impact of combination of (FL) (Baker, 2000; Lage et al., 2000) and gamification (Kapp, 2012) on student learning experience in management subject area. Along with the blend of different learning approaches, it is equally essential to establish relevance between course content and students' background (Keller, 1983; Frymier & Shulman, 1995).

Since we have blended FL and gamification approaches for this study, we refer to it as gamified flipped classroom (GFC) learning approach. We aim to explore, extend and report the efficacy of GFC as compared to a TC, where the efficacy is measured by enhancing student engagement, reducing the complexity of the technique, enabling clear task orientation, increasing student satisfaction, and improving session effectiveness (Durrani, 2019). We attempt to answer the following research question: *Is the efficacy of GFC more than the TC considering the content relevance?*

The paper's organization is: Section 2 provides literature on related studies in the effectiveness of FL, gamifications and then the development of the study hypothesess for the quantitative analysis. In Section 3, we discuss the methods of data collection, quantitative analysis and interviews data. In Section 4 we provide the results and discussion of the quantitative analysis and the interviews. Finally, Section 5 concludes with the research question, implications, limitations, and directions for future research.

Related studies and hypotheses development

The effectiveness of FL

The term flipped learning (FL) was derived from Baker (2000) and Lage et al. (2000) to accelerate students' learning effectiveness and to enhance teaching experience in higher education. As Hamdan et al. (2013) proposed, the components of an FL constitute three key elements and four pillars. Key ingredients include familiarization of the study material before the session; rewards to motivate students to prepare for the class and measure their understanding; and time to understand in-class activities. Toqeer (2013) highlighted the mandatory requirements of an FL by including the physical presence of the student in the classroom and understanding of the study material distributed before the session.

Several studies explored the successful implementation of FL using different data collection methods in different countries and educational disciplines, including medical, engineering, arts, and business (Mok, 2014; Prashar, 2015; Zainuddin & Attaran, 2016; Chen & Law, 2016; Sung et al., 2017; Kim, 2018; Alsaleh, 2020; Ping et al., 2020). For example, a recent study by Pérez et al. (2019) explored the perceived positive effects of FL methodology and found that students' motivation, knowledge, general skills, and engagement contribute towards effectiveness. In another study using comparative analysis of flipped, online and traditional teaching in management courses at a business school in the Middle East, Fadol et al. (2018) found that both online and flipped sections performed better than traditional, and flipped classroom section performed better than online, however student absenteeism was higher in the traditional mode than in the flipped classroom. Students believe the flipped classroom was more helpful in learning and increase interaction with the instructor and other students.

Similarly, in studying the experience of FL in two business management courses in a Spanish university, Martínez-Jiménez and Ruiz-Jiménez (2020) found that students'

satisfaction and learning performance improve when used the FL methodology. In addition, this methodology proved that the relationship within colleagues and between students and professors have been much closer and more spontaneous. In contrast, comparing students in FL to TC, Beenen and Arbaugh (2019) found that students in the FL work harder, were less satisfied, and less interested in a future FL. Öncel & Kara (2018) proved that course learning outcomes were improved while using FL and outperformed that of the TC settings. However, FL requires more significant effort from both teachers and students than in traditional method settings. The study of Casredo et al. (2019) showed similar results where the students were reluctant toward new technology because of the lower learning grades obtained.

However, Chan et al. (2020) found a low degree of acceptance and negative feelings of FL among pharmaceutical students, which was mainly due to the inappropriate use of the flipped methodology and the increase of student workload. Similar findings were reported by Kim (2018). Comparing problem-based learning, service learning, FL, and project-based, to TC in a USA university, Garnjost and Lawter (2019) found that only project-based learning was perceived to have a significant impact on student satisfaction. Students indicated no significant differences in perceived learning outcomes and satisfaction across all other pedagogies compared to lectures.

While most studies above showed that FL is considered to be more effective in terms of perceived learning outcomes than TC, it is still to be confirmed whether this is true across different subject area and when blended with gamification.

Game-based learning (GBL) and gamification

Game-based learning (GBL) was initially advanced by Prensky (2003) to incorporate game-like features into the educational context. These approaches gained importance in the past decade to digitally engage and motivate people to achieve their goals (Burke, 2016). According to Liao et al. (2019), the impact of the GBL technique depends on identifying goals and challenges; handling the responsibility for achieving the task; and tracking the improvement to examine if the methods are valid for reaching the goal. While there are many benefits of using GBL in teaching and engaging students/players, there are significant challenges to implement GBL including students' proficiency with

technology, creating a customized game, especially if a teacher is not a game designer (Phoa and Dinscore, 2015).

Deterding et al. (2011) later introduced gamification as applying digital game mechanics in a non-gaming context. The purpose of gamification is to engage learners, motivate activities, enhancing learning, and solving problems (Kapp, 2012). The most common game mechanics used include points systems, leader board positions, badges, trophies, achievements, competitions, and levels (Dicheva et al., 2015). Gamification learning approaches offer opportunities for students to be engaged, motivated, and enjoying themselves while learning (Landers and Landers, 2014).

In assessing a gamified strategy for teaching project portfolio management to MBA students, Barbosa and Rodrigues (2020) found that students evaluate the gamified experience as superior compared to other learning methods. Gamification contributed to their learning of project management processes and techniques and helped them practice what they learned. Similarly, in studying the intrinsic motivation of undergraduate business students who used a business simulation game, Buil et al. (2019) found that business simulation games are practical tools for motivating and engaging players. Players' intrinsic motivation facilitates engagement with business simulation games and perceived learning leading to the development of generic skills. Martí-Parreño et al. (2019) found that gamification encourages teamwork, oral communication skills, critical thinking, and social skills development for students.

However, Whitton and Langan (2019) argue that although there is evidence that gamification is motivational for some students, largely it depends on specific types of games used and the contexts of use. Perryer et al. (2016) argue that the effects of gamification are highly dependent on the individual and context, and gamification strategies should emphasize cooperation rather than competition and should facilitate need satisfaction and satisfy drives.

Efficacy factors, GFC and TC (hypotheses development)

In education, the relevance is the student's perception of whether the course instruction/content satisfies personal needs, personal goals, and/or career goals (Keller, 1983). Although previous experience and knowledge influence the students' perception, presentation of the content also affect content relevance to students' mind (Frymier and

Shulman, 1995). The ARCS (attention, relevance, confidence, satisfaction) model by Keller (1983, 1987) describes the influences of different factors on students' motivation to study, and in Keller's model, teachers must first gain students' attention using different strategies such as introducing innovative learning approaches or tools, and then emphasizing adaptable tasks or content that satisfies their needs.

On the other side, student engagement is the aggregate of physical and mental energy that the student dedicates to the academic experience (Astin, 1984). The energy devoted can be allotted to studying, interacting with faculty and fellow students, unlike unengaged students who spend little time and energy on studies (Hsieh, 2014). Task orientation is the maximum amount of well-organized and flawless tasks given to the students by the teacher (Fraser et al., 1986). The study of Lin & Chen (2013) proved the close connection between task orientation and educational quality.

As per Lee (2011), a happy and positive attitude towards the learning activity leads to student satisfaction, and the positive attitude toward learning activity involves the students' approach towards, lecturer, study material, teaching approaches, or learning methodologies. The relationship between learning effectiveness and students' satisfaction needs consideration in 'service'. Subsequently, the learning effectiveness changes to service quality, as defined by Appleton-Knapp and Krentler (2006) as consumers' overall impression of the relative inferiority/superiority of the organization and its services.

We can measure the complexity of the technique or the learning approach by observing the time required invested both by the students and the teacher, the advanced knowledge necessary to understand the technique, the technological resources needed to perform through the technique, and the impact of the technique on the final grades (Orús et al., 2014). The mere implementation of an innovative teaching method such as FL is not enough to guarantee its success, as teachers should create and implement continuous assessment methods which may enable the students to gain skills, knowledge, and motivation (Pérez et al., 2019).

Recent research articles on efficacy of learning methods suggested that the new pedagogy methods like FL are more exciting and engaging than traditional models (Butt, 2014). Three subcategories to consider under effectiveness, namely general skills (critical thinking, synthesis), knowledge about the course content, and learning motivation of the student. Similar results were reported by Pérez et al. (2019) study, which was derived

from the work by (Alavi, 1994). In this context, Sunley et al. (2019) argued that creative skills are becoming more valued in a changing workplace. Creativity within curriculum design encourages student engagement and uses different processes of cognition to understand themselves as learners better. From an entrepreneurial education perspective, Peschl et al. (2020) argue that learning through failure conveys entrepreneurial knowledge by allowing students to 'fail forward', and that FL allows for concrete and operational learning to occur through a series of experiential activities.

In the context of GBL, although there is evidence that gamification is motivational for some students, largely it depends on specific types of games used and the contexts of use (Whitton & Langan, 2019). and when blended with FL could give different outcomes to students learning. As most past studies have shown the efficacy of flipped classrooms and gamification learning approaches. Therefore, we need to investigate how the adoption of gamification to FL works as little is known about the effectiveness of student learning when these learning approaches are blended. Therefore, we study the efficacy of gamified flipped classrooms (GFC) compared to a traditional classroom (TC) learning approaches. Based on the above discussion, we propose the following hypotheses for our quantitative analysis, supported with interviews with two groups of students in the experimental cohort:

H1: GFC and TC have no significantly different effect on student engagement.

H2: GFC and TC have no significantly different effect on the students' task orientation.

H3: GFC and TC have no significantly different effect on the students' satisfaction.

H4: GFC and TC have no significantly different effect on the students' attitude towards the complexity of the technique.

H5: GFC and TC have no significantly different effect on the students' general skills.

H6: GFC and TC have no significantly different effect on the students' knowledge.

H7: GFC and TC have no significantly different effect on the students' motivations.

H8: GFC and TC have no significantly different effect on students' course learning outcomes.

Methods

We submitted an ethics application to the University ethics committee. After written approval to conduct the research was received (approval# MC-H-F-2020-04-30), the

study begun. The survey data was collected using a secured Moodle platform. This environment was only accessible to enrolled students, authorized academic and technical staff. Before the survey, students were presented with an online consent form and notified of their choice to take part or withdraw. We assured students' anonymity throughout the study and all subsequent presentations and publications emanating from it.

For the research, we followed the research model of Pérez et al (2019) which explores a causal model, using Structural Equation Modelling (SEM), in order to understand how the perceived effectiveness of 'flipped classroom' and students' satisfaction with this technique can be affected by students' engagement in 'flipped classroom' activities as well as the complexity and task orientation of such activities. We have conducted an online survey using thirty close-ended questions based on the latest factors and sub-factors (as listed in Table 1) with a 5-point Likert-type scale. The scale included 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. We collected the data and performed the quantitative analysis to compare the efficacy of learning approaches for the cohorts. Table 1 illustrates various latent factors, literature references, and the measurement scales used.

Table 1 Measurement scales

Latent Factors	Sub-factors and/or References	Hypotheses
ENG - Student Engagement	ENG - (Fraser & Treagust, 1986)	H1
ORI - Task Orientation	ORI - (Fraser & Treagust, 1986)	H2
SAT - Student Satisfaction	SAT - (Fraser & Treagust, 1986)	H3
COM – Complexity of the technique	COM - (Orús, et al., 2014)	H4
SKL - General Skills	SKL - (Alavi, 1994)	H5
KNW – Knowledge	KNW - (Alavi, 1994)	H6
MOT – Learning Motivation	MOT - (Alavi, 1994; Leidner & Fuller, 1997)	H7
CLO - Course Learning Outcomes	CLO - Öncel & Kara (2018)	H8

Table 2 illustrates provides more detailed information on the measurement scales used.

Table 2: Measurement scales (detailed items)

Sub-factors and/or References	Items
(Fraser & Treagust, 1986)	**ENG1:** I place enough effort in course activities; **ENG2:** I have given more attention to what my peers have described during these activities, **ENG3:** There were chances for me to discuss my point-of-view in course activities
(Fraser & Treagust, 1986)	**ORI1:** I knew precisely what to do in these course activities; **ORI2:** Course activities were well-defined, for everyone;**ORI3:** Course activities were planned clearly and carefully
(Fraser & Treagust, 1986)	**SAT1:** Course activities were quite satisfactory; **SAT2:** I actively looked for opportunities to participate during these course activities;**SAT3:** I generally had a sense of satisfaction after the class session
(Orús, et al., 2014)	**COM1:** Course activities required investing lots of time;**COM2:** Course activities required advanced knowledge;**COM3:**Course activities required inaccessible technological resources;**COM4:** Course activities had a little impact on my final grade
(Alavi, 1994)	**SKL1:** Course activities have increased my analytical ability to think;**SKL2:** Course activities have increased my synthesis ability;**SKL3:** Course activities have allowed me to identify, associate the most important ideas;**SKL4:** Course activities have increased my critical analysis ability;**SKL5:** Course activities have given me opportunities and boost my confidence to express ideas;**SKL6:** Course activities have enabled me to appreciate others' point of view
(Alavi, 1994)	**KNW1:** Course activities have aided me better to understand the scope of a particular topic;**KNW2:** Course activities have enhanced my understanding of course topics;**KNW3:** Course activities have assisted me to gain knowledge during in-class hours
(Alavi, 1994; Leidner & Fuller, 1997)	**MOT1:** Course activities have facilitated by making classes more exciting;**MOT2:** Course activities have supported in making classes more enjoyable;**MOT3:** Course activities have aided me to be more attentive during classes
CLO - Öncel & Kara (2018)	**CLO1:** Identify several challenges that a business manager might face in managing successful development and use of IT in business;**CLO2:** Define various business information systems, including transaction processing systems, management information systems, decision support systems, and group support systems;**CLO3:** Identify the major software categories and e-commerce applications;**CLO4:** Identify several major developments and trends in the business applications of telecommunications and Internet technologies;**CLO5:** Assess the security issues associated with using IT in business and determine the range of social and ethical issues involved in the use of Information Technology in society

Table 3 describes the characteristics of the selected student cohorts. Those students were contacted by three of the co-authors who are academic staff at the same university. Since we also wanted to evaluate the effects of content relevance based on students' previous background and knowledge, it became the basis for our selection and assignment of control/experimental groups with programs. For example, an IT foundation course would naturally be more relevant to students in the IT/IS program than students from other programs.

The data collection was conducted during the summer semester with a teaching workload lighter than the other two semesters per academic year. To test GFC, the researchers had to develop or identify various pre, post, and in-class activities and tasks to keep students motivated throughout the summer semester. For example, instead of delivering face-to-face lectures, the researchers had to identify topics and tasks for the students before every GFC session based on lecture resources, other supporting material, and gamified quiz to cover the relevant topics. This took a considerable amount of time to research and plan each of these sessions. Beside two formal paper-based quizzes, the researchers took eight gamified quizzes during the class sessions with the total number of 10 quizzes during the course. It also provided students with one project assignment and two formal examinations.

Table 3 Cohorts characteristics

Research Perspectives	Traditional Classroom (TC)	Gamified Flipped Classroom (GFC)
Students' cohorts and sample size	A Control group of 85 students from the IT/IS program (47 responses)	An experimental group of 97 students from Accounting, Finance, Marketing, and Management programs (58 responses)
Duration of course	Six weeks	Six weeks
Age	20-25 years	20-25 years
Credit hours	Three credit hours (three two-hour lectures and two two-hour labs per week for six weeks)	Three credit hours (three two-hour lectures and two two-hour labs per week for six weeks)
Assessments and weightage	1 paper-based midterm exam (20%), 2 paper-based formal quizzes (20%), team project (15%), in-classroom actities (5%), practical lab assessment (10%), 1 paper-based final exam (30%)	1 paper-based midterm exam (20%), two paper-based formal quizzes (10%), a team project (10%), 4 gamified online quizzes (10%), in classroom activities (10%), practical lab assessments (10%), 1 final exam (30%)

The planned components of the GFC activities are: (1) For every lecture, students prepared through textbooks, lecture slides, and additional resources available on Moodle. (2) During the session, the lecturer assigned topics or questions to student groups for

around 15-20 minutes; each group then presented and explained the assigned topic to other student groups. (3) Then, an open round of discussion between the groups and the lecturer. At the end of the session, the lecturer summarized the main ideas discussed, (4) using the concepts discussed. Based on a preliminary reading of specific lecture slides, all students had to go through a gamified online quiz using Kahoot or Socrative or our own developed CrossQuestion educational game.

After delivering both GFC and TC sessions, researchers collected the survey data from both cohorts using the same Moodle survey questionnaire. Out of the 85 control group students, we collected 47 valid questionnaires with a response rate of 55.30%. From the 97 experimental group students, we collected 58 valid questionnaires with a response rate of 59.80%. We also collected the views of the experimental group of students by conducting interviews with 20 students. Figure 1 presents the complete research design for the quantitative side of this study, from the literature review through the research method to the findings and conclusion.

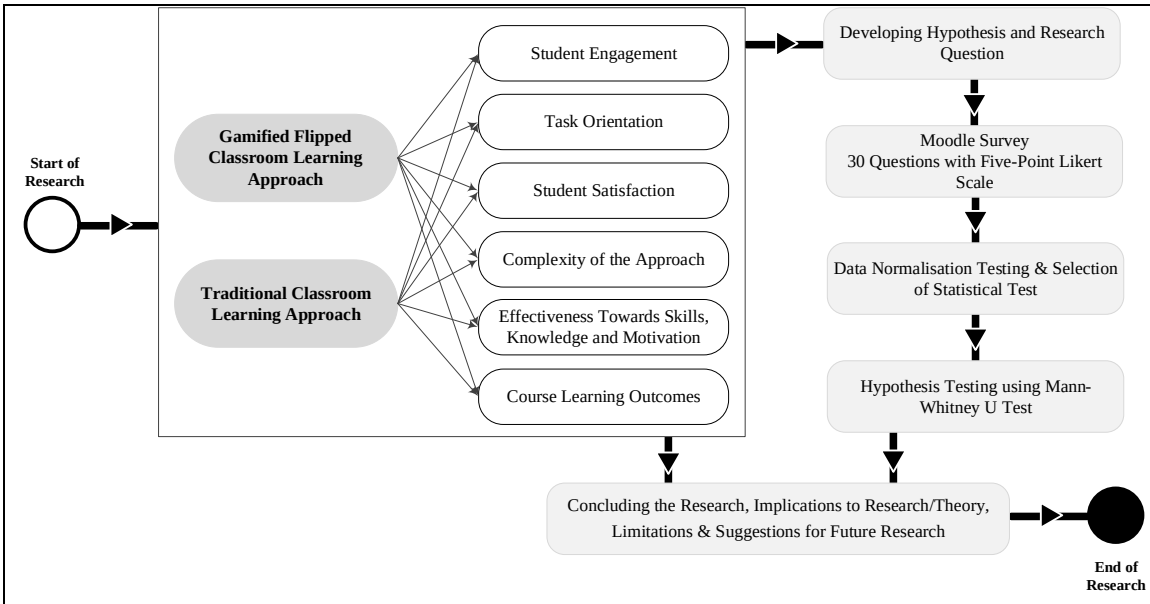

Fig 1. Quantitative Research Design of the Study

Results

Quantitative results

Using SPSS2020, we applied several statistical tests to our data. Kolmogorov-Smirnov and Shapiro-Wilk's normality tests ($p>0.05$) applied to all the latent factors and sub-

factors (Table 1). The result obtained for both GFC and TC cohorts were not normally distributed. For example, the latent factors ENG in GFC (M=3.79, SD=1.061) with Skewness of -1.622 (SE=0.364) and Kurtosis of 2.245 (SE=0.749). Whereas ENG in the TC (M=2.97, SD=1.359) with Skewness of 0.602 (SE=0.553) and Kurtosis of -1.715 (SE=1.118). ENG in GFC D(58)=0.492, p=0.000. Similarly, ENG in TC D(47)=0.388, p=0.000. Based on the above test results, we selected the Mann-Whitney U non-parametric test to analyze the data further.

The result of the non-parametric Mann-Whitney U test is presented in Table 4. The Sig. (p-value) corresponds to the U test, where the results of the GFC cohort were evaluated and compared to determine whether they are better than for the TC cohort. Along with the significance (p-value) for each latent factor, Table 4 also provided the average mean ranks for both GFC and TC cohorts. All eight null hypotheses got rejected, representing a statistically significant difference with a p-value > 0.05.

Table 4 Mann-Whitney U Test Results – GFC vs. TC

Latent Factors	Gamified Avg. Mean Rank	Traditional Avg. Mean Rank	Z	p-value	Hypotheses Outcome	Result
Engagement	29.37	20.92	-1.52	0.06	H1 – Rejected	GFC > TC
Orientation	28.77	22.65	-1.53	0.06	H2 – Rejected	GFC > TC
Satisfaction	28.41	20.06	-1.43	0.07	H3 – Rejected	GFC > TC
Complexity	27.98	19.96	-1.12	0.13	H4 - Rejected	GFC > TC
Skill	27.54	21.43	-1.05	0.15	H5 – Rejected	GFC > TC
Knowledge	26.84	27.15	-0.14	0.44	H6 - Rejected	TC>GFC
Motivation	29.67	18.86	-1.04	0.15	H7 - Rejected	GFC > TC
CLO	25.37	30.01	-0.64	0.26	H8 - Rejected	TC>GFC

The test result for student engagement (H1) was not significant, z=-1.52, p>0.05. GFC cohort had an average mean rank of 29.37, while the TC cohort had an average rank of 20.69. The student engagement in the GFC was better than in TC, hence rejecting the null hypothesis for H1. For the student orientation (H2) test result was not significant, z=-1.53, p>0.05. GFC cohort had an average rank of 28.77, while the TC cohort had an

average rank of 22.65. As a result, GFC has shown better results for student orientation as compared to TC. The result of the Mann-Whitney U test for student satisfaction (H3) was also not significant, $z=-1.43$, $p>0.05$. GFC cohort had an average rank of 28.41 as compared to 20.06 for the TC cohort. According to the result, the GFC approach performed better than TC.

The Mann-Whitney U test for the complexity of the technique (H4) was not significant, $z=-1.12$, $p>0.05$. GFC cohort had an average rank of 27.98 as compared to 19.96 for the TC cohort. As a result, we identified GFC as a better approach for the technique's complexity than TC.

We observed the efficacy of the GFC and TC in three different aspects: 1) skills developed by the student through the course due to the learning approach taken. 2) Knowledge gained by the student from the course through the delivery of the learning approach taken. 3) The motivation of learning throughout the delivery of the course (Baker, 2000; Lage et al., 2000). Three hypotheses associated with learning approach efficacy: H5, H6, and H7. The Mann-Whitney U test for Skill (H5) was not significant, $z=-1.05$, $p>0.05$. GFC cohort had an average rank of 27.54 as compared to 21.43 for the TC cohort. For knowledge (H6), the U test was also not significant, $z=-0.14$, $p>0.05$. GFC cohort had an average rank of 26.84 as compared to 27.15 for the TC cohort. Similarly, for motivation (H7), the U test was not significant, $z=-1.04$, $p>0.05$. GFC cohort had an average rank of 29.67 as compared to 18.86 for the TC cohort. In terms of skill and motivation, we identified GFC as a better approach as compared to TC. For the knowledge, TC had a slightly better average score as compared to GFC.

The Mann-Whitney U test for course learning outcomes (H8) was not significant, $z=-0.64$, $p>0.05$. GFC cohort had an average rank of 25.37 as compared to 30.01 for the TC cohort. Similar to knowledge (H6), CLO (H8) has shown better TC scores than GFC.

Results from focus group interviews

To confirm the results of our quantitative analysis, we have conducted interviews with 20 students through two focus groups from the experimental cohort. The majority of students confirmed our quantitative results above. The following statements show the students' views towards using GFC comparing to TC:

"What I liked most about the course is the in-class activities made the course much more fun, and enabled us to learn in an interactive way. I believe that most chapters will very useful in other courses or even in my own life, because nowadays technology is everywhere and in everything"

"As a finance student, this course demanded a lot of memorizing which was my least favorite part. However, I found the Tuesday class activities very useful and fun. It helped to familiarize ourselves with the concept and made it fun. I liked the gamified flipped classroom activities and would like to thank the doctor for the effort and dedication he has put into setting those activities for us"

"I like this course because I saw something new which is game activities that helps us to study each chapter through the game and that's new and smart way to enjoy class"

"I learned new things about information technology and the way the dr taught us was amazing enjoyed the games during the class and the team works"

"I liked the course because it was fun"

"Overall it was a great experience. I have learn lots of the thing from this course"

"What I did not like was the fact that the classroom activities with the flipped room was not done in a specific group, which means that some will actually do the work while others won't, and the dr wouldn't ask who did what, so that really made some student dislike the classroom activity, the dr should really have been watching and seeing the processes of the students to know who should get the marks and who shouldn't. And the time limit to submit the work was too small, we students have other courses and assignments to also do, and after the class is over we immediately have another class. So I wished that he give us more time".
"I liked it because it makes the lecture less boring and I tend to understand the lecture more and gain marks".

"I liked the delivery of information"

"The course was easy but it has to be improved by having lab lectures or formal tutorial classes"

"I Like the instructor way of how implementing the course but of course, if it was face to face class would be better, the best experience in this course was the tutorial part"

"Activities where great for learning, the lectures were well formed and had proper pacing, nothing was too fast or too slow, there was a lot of information, but it was easy to keep up and understand the ERP systems in general"

"Superb performance by the instructor is worth mentioning, with many classroom activities, and group work. which helped teach me the course well"

"Simply because it gave me an outlook to the future work environment"

"The way of delivering the course requirements made me like the course and also the activities that have been done"

Discussion

The primary goal of this research was to measure the perceived efficacy of GFC as compared to TC. We explored different aspects in this study including, student engagement in the classroom, task orientation clarity, effect of the complexity of the technique, course effectiveness, course learning outcomes achieved, and the overall

students' satisfaction. For this purpose, we developed a delivery model and applied it to a mandatory IT and management foundation course studied by 85 control group undergraduate students and 97 experimental group undergraduate students.

Theory implications

As our contribution toward the theory of teaching and learning, our results have identified GFC as more efficient than TC in enhancing students' engagement, increasing motivation improving the tasks orientation, reducing the complexity of the technique, and positively influencing students' ability to put in more efforts to complete course duration and enabling more chances to discuss relevant topics during and after the classroom sessions. Our results are consistent with previous results reported by (Zainuddin, 2018; Low and Hew, 2018; Asiksoy, 2018; Murillo-Zamorano et al., 2021). However, a study by Ab.Rahman et al. (2018) showed that the students were positively inclined towards gamification, mainly because of the platform's ease rather than the benefits they can get from the gamification.

Our study has also confirmed the relationship between engagement and motivation. We studied motivation in our research by interviewing two focus group of students and found positive excitement, enjoyment, and attention (Alavi, 1994; Leidner & Fuller, 1997) for both learning approaches. Similar to our study, results reported by Pérez et al. (2019) and Huang & Hew (2018) found that the relationship between engagement and motivation showed the efficacy of the FL learning approach in their context.

As a result, this study identified the gamified learning approach as a more efficient learning approach in all aspects. However, the results of our research have surprisingly shown that the TC cohort achieved better course learning outcomes as compared to the GFC cohort, which to some extent dismatches with some previous studies that found positive learning outcomes for students in the GFC (Wu, 2018; Zainuddin, 2018; Low and Hew, 2018; Asiksoy; Yildirim & Sen, 2019; Huang et al., 2019; Chen et al., 2019; Wang, 2019, Borit & Stangvaltaite-Mouhat, 2020). One possible interpretation for this unexpected output might be, that TC was applied to the control group with their major in IT/IS and a GFC was used for the experimental group with majors in Accounting, Finance, Marketing, and Management. Although the students in the experimental group were very engaged and motivated because of the gamified nature of the classroom

experience, they could not able to see any relevance of many topics and concepts delivered through a standard IT foundation course (originally developed for IT students). For this research, lecturers delivered this course without considering the need to customise the content to align it with the students' relevant backgrounds, i.e. Accounting, Finance, Marketing, and Management. Therefore, the question of "what's in it for me?" as originally coined by Frymier & Shulman (1995) appeared within the experimental group.

Castedo et al. (2019) highlighted that the FL approach works better when such experience combines theory and practice rather than just practice alone. Our learning delivery model combined both theoretical and practical components. This study showed that although GFC is helping in improving the task orientation and deliver complex topics to the students, it does not directly contribute to the overall students' satisfaction, skill development, and knowledge acquisition. On the contrary, the course learning outcomes scores of the TC were better or equal to GFC.

Practical implications

Our recommendations for the teachers and designers are to consider applying the GFC model, emphasizing the relevance of the content delivered based on students' backgrounds. Also, they should use the GFC model by applying both the theoretical and practical components for their courses. In addition, the designers should adapt to the situation to try out different weightage of flipped, gamification, and traditional activities and assessments to verify and validate the efficacy of their blended delivery models.

Lecturers and course designers are also recommended to consider the Universal Design for Learning (UDL) principles developed by CAST which based on three main principles: engagement, representation, and action and expression. CAST's UDL Guidelines are a tool to support teaching and learning. They can be used by professional educators, curriculum developers, researchers, parents, and anyone else who wants to apply the UDL framework to practice in a learning environment.

Limitations and suggestions for future research

Beyond our contributions to the extant research, we recognize that our study has limitations. Readers and future academics, and researchers should know these and

interpret the material presented in this paper within the context of the limitations. The limitation of this paper is its convenient sampling through enrolled students of the IT foundation course in an undergraduate program. It does not consider different courses, programs, colleges, institutes, and educational levels. As a result, it would challenge to generalize the findings of this paper to other research contexts.

Future studies should follow the delivery model of this study with different samples of students, types of courses, nature of programs, level of degrees, and geographical diversity, to validate and generalize the perceived efficacy of the GFC in areas other than university teaching of IT foundation course. Researchers can address the sample size limitation by applying this study at the program, degree, or university-wide levels. This study has used a blend of FL activities and assessments (40%), gamification activities and assessments (30%), and traditional activities and assessments (30%). Future studies should employ different weightage of these learning approaches to generalize results. Also, we conducted this study by delivering IT foundation courses to GFC and TC cohorts by the same instructor. Therefore, future studies should study the effect of GFC in the presence of multiple instructors or different students' characteristics.

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