

The effectiveness of blending active learning and gamification in classrooms

Idrees Ali Hasan

IT department, Technical College of Informatics-Akre Duhok Polytechnic University, Duhok,
Kurdistan Region, Iraq

Translation Department, Nawroz University, Duhok, Kurdistan Region, Iraq

Idrees.ali@dpu.edu.krd

Yaseen Alzebaree

Qabas Centre for Research and Development

Yassin.teacher@gmail.com

Abstract

The study aimed to examine the effectiveness of integrating active learning and gamification in classrooms as a new teaching methodology. Nowadays, teachers must equip themselves with new teaching methodologies to meet the goals of the student-centered approach requirements. As it is obvious many teachers here still stuck to the traditional method (teacher-centered learning), hence, they encounter several challenges and difficulties in teaching. Based on the new strategies of learning methodologies which recommend helping students build positive attitudes toward their learning. In this research, we demonstrate how Active Learning and Gamification-based evaluation and activities can serve as an alternative to improve student attitudes and foster a more welcoming environment in the classroom. The qualitative research method and ethnographic approach were both used in this study.

Keywords: student-centered learning, new teaching methodologies, gamification, active learning.

INTRODUCTION

The society of the twenty-first century is characterized by the dominance of digital technology. Our current technological advancements have created a digital community that is constantly changing. The labor market requires adaptable, innovative individuals who can constantly reinvent themselves and take an active role in their continuous learning. Daily, students in the classroom show lack of interest and lack of motivation to learn, this may be due to different factors that may be external or specific to the classroom as described by Longmore et al. (2018)

Prensky (2010) states that new students have undergone a radical change and call them *Digital Natives*, who think and process information differently, which poses a generation gap. Some of the distinctive characteristics of digital natives mentioned by Prensky (2010) are:

- They want to receive information quickly and immediately.
- They are aware that they make progress if they have immediate satisfaction or rewards.
- They prefer to learn playfully rather than embark on traditional

Students with these characteristics make teaching very difficult for teachers who for years have maintained the traditional teaching method centered, where students regularly remain passive in a unidirectional discourse (Gaitan, 2011). The lack of understanding of this new context generates negative classroom environments for both teachers and students (Arreguín, 2011). As a consequence of this situation can be observed in students, continuous distraction, short attention spans, and boredom, factors that demotivate teachers. Torres (2009) describes that the traditional teaching method used by teachers are focused on students only copying and memorizing without understanding, which causes idleness, boredom, and disinterest.

Some researches show that the teaching method is an essential and fundamental part that can modify the environment and attitude of students in a classroom (Sovero, 2015; Alzebaree & Zebari, 2021). Didactics is an area of research that belongs to the educational sciences and has no single definition, but Mallart (2001) defines it as the “science of education that studies and intervenes in the teaching-learning process to achieve the intellectual formation of the learner.” Expanding on this definition Torres (2009) describes that: didactics is constituted by the methodology approached through a series of procedures, techniques, and other resources, through which the teaching-learning process takes place.

New learning methodologies are continuously emerging attempting to innovate the didactics used in the

classroom and improve the teaching-learning process, however, there is still no one that could provide a definitive solution, so we can mention proposals such as Inverted Classroom (IA), Competency-Based Education (CBE), Collaborative Learning, Artisanal Learning (AA), Gamification, Challenge Based Learning, among many others. Each of these learning methodologies has certain characteristics that make them unique and from different perspectives, provide ways to modify didactics, and teacher-student interaction, improve learning processes, and some have more activity in students than others.

One of the challenges for teachers is to find a teaching method that can be adapted to the teaching of the content of their courses, this problem is often not so easy to solve or implement. A study by Labrador (2016) describes that this new generation is used to playing and giving an automatic response when faced with a game mechanic. Thus, the topic of interest in this research is to recognize what happens when two learning methodologies that produce more student activity are integrated and based on their principles, generate a new way to teach theory and practice, present the contents and evaluate.

To achieve this objective, the research focused on integration between Active Learning (Bonwell, 1991) and Gamification (Hsin, 2013), to design a new way of leading the group, presentation of content, and exercises, to achieve an experience that allows encouraging learning in difficult topics. This research was conducted under a qualitative approach using the ethnographic method, to document and obtain evidence of the results obtained in teacher-student interaction, student-student interaction, and contextual environment in the classroom.

Literature review

1. Active learning

Fayombo (2012) asserts that active learning is an essential part of the learning process and that students should actively participate in lectures. Students engage in the learning process by gaining knowledge and comprehension through active learning. Active learning is a broad notion that typically includes instructor-led, student-centered learning activities (Felder and Brent, 2009). It also covers any course-related task that all students are required to complete in a class session in addition to just watching, listening, and taking notes (Felder and Brent, 2009). According to Hsin, (2013), active learning involves students in activities like reading, discussing, and writing, as well as high-order, thinking such as analysis, synthesis, and assessment. It also encourages students to consider their views and values. Therefore, active learning is generally not a concept of learning but one of teaching.

Previous studies on active learning from the perspective of student learning outcomes have generally been encouraging (Freeman et al., 2014), proving that it is superior to more conventional, content-focused methods like lectures. Case studies, concept sketching, mapping, and online forums are all examples of active learning (Felder and Brent, 2009; Hasan, 2022). Tuparov et al. (2018) employed badges to indicate the student's progress in peer assessment, whereas Azmi and Singh (2015) incorporated an avatar and a leaderboard in an LMS to enhance student learning.

2. Students' engagement

While Nakamaru (2011) proposed that student engagement is related to deliberate attempts by students to devote time and energy to educational activities, Nisiotis and Kleanthous (2019) defined it as a commitment or effort made by students to participate in learning activities. Three elements of student involvement can be identified: behavioral, emotional, and cognitive involvement (Sun and Rueda, 2011). According to Fredericks, Blumenfeld, and Paris (2004), behavioral engagement refers to a type of student behavior that is seen as being crucial to learning, such as behavior in class, involvement in extracurricular activities, and interest in academic work. The term "emotional engagement" refers to emotional or psychological responses to classmates and teachers that may include feelings of attraction, boredom, happiness, and melancholy (Ding, Kim, and Orey, 2017). Finally, cognitive engagement is the effort that students make to acquire, comprehend, and master the concepts or abilities emphasized in their academic work. This effort is characterized by their interest in the learning process (Cooper, 2014;). Research by Khan et al. (2017) has shown that when used properly throughout a course, active learning practices frequently promote student engagement and have a significant impact on student learning.

3. Gamification

Deterding et al. (2011) define gamification as a non-gaming environment that incorporates game features to enhance the user experience and boost engagement to accomplish stops.

According to Groening and Binnewies (2019), participating in activities that incorporate gamification features is analogous to playing a game. Gamification has been shown to increase motivation and productivity, according to Sailer et al. (2017). Gamification is one of the most successful learning strategies for encouraging active learning and offers clear benefits in a variety of non-game settings, including the disciplines of learning and health (Hammedi, Leclerq, and Van Riel, 2017).

Materials and methods

The research was conducted in two stages, the first one was a learning stage and the identification of activities that could better help the purpose of designing a new form of group management and evaluation. The second stage allowed us to design the dynamics in class and modify the way of evaluating. The participants of this study were 17 students from the Translation Department, College of Languages, Nawroz University with classes of four hours per session once a week. One of the first steps was to know the objectives and the way of working of the selected learning methods, so we have that:

Active Learning aims to involve students actively in the class, makes them protagonists, and makes them think about what they learn, not just listen to the class, Kersey (2000).

In this way, the implicit purpose is to move the student from a passive to a very active state in the class and to make him feel that he is not just attending a class, but that he is part of the class.

On the other hand, Gamification refers to the use of game design elements and principles to be used in non-game contexts, Contreras (2016). That is, game theory and mechanics are used to involve, motivate and engage learners, thereby seeking to transform a routine and unattractive activity into a dynamic and motivating activity, Kapp (2012). Neither of these two learning proposals is new, what is important and challenging is to find ingenious and attractive ways to use them in the classroom. Thus, the research considered these methodological proposals of learning because the first one allows us to induce students to participate in different types of activities, and allow them to feel involved, being able to contribute to the class knowledge or material of interest in the different topics to be addressed. On the other hand, gamification gives us the possibility of being able to give a mechanism of interest, excitement, and fun to all the activities to be performed, Villalustre (2015).

To achieve this integration, it was divided into two modules, the first related to the "*evaluation*" in which gamification was the selected approach, and the second was focused on the "activities" in the classroom, where the way of presenting the contents and the resolution of exercises is involved.

Evaluation Module

In general, a class has three important parts: didactics, group management, and evaluation, the latter being one of the main points of interest for teachers and students.

Traditionally, when a course starts, the first class is focused on explaining how the partial evaluations will be conducted and what will be considered for a final evaluation. The issue of assessment is widely discussed by Santos (2014) and he describes that a traditional assessment based on exams often generates demotivation and a feeling of injustice by not measuring the real effort that a student can make throughout a course.

In the first stage, with the focus group approach, research was conducted with students, where one of the main aims was to find that the word "exam" and "homework" caused tedium, stress, and unnecessary pressure, as students related these words mostly to frustrating past experiences. This same previous research found that students preferred class-by-class continuous assessment as a fairer way to obtain a final grade. Delgado (2006) describes how continuous assessment has several advantages over traditional assessment by examination. Among the advantages, he mentions that such an assessment allows for continuous feedback between teacher and student, provides an opportunity to monitor academic performance, and gives us a clear possibility of correcting errors when they are identified early on.

With this prior knowledge and integration of Gamification principles, the traditional assessment based on tests and tasks was eliminated, which was replaced by an assessment based on video game design, in which obtaining and accumulating points is one of the ways to engage the player, it also allows to generate a ranking of all participants; this in practical terms, can be translated into a continuous assessment, Delgado (2006), Hsin (2013).

From previous experiences of classroom interaction with students, it is known that offering half a point or even one point in an evaluation for performing an activity is not attractive to students, since psychologically the brain thinks of a small amount that does not offer any incentive, even if this point is offered in the final grade. Thus, an incentive used in video game interaction was proposed, where awarding thousands of points for successful actions improves self-esteem and motivates the player.

To achieve this purpose we started from a scale of 0 to 10 traditional to one multiplied by 100,000 obtaining a scale of 0 to 1,000,000, which psychologically produces a different reaction in the brain, as this is incentivized differently, i.e., if you offer $\frac{1}{2}$ point in the final grade this is not motivating, however, if you offer 35,000 points for an activity, the brain reacts differently, as it relates a strong and juicy reward; being in an accumulative scheme of thousands of points the reward is more attractive and motivating; this is undoubtedly a very effective psychological trick since in reality, the 35,000 is a minor offer since in equivalence it is $0.35 < 0.5$

of the first offer.

In this context, the dynamic of evaluation in the class was to pose to the student that the individual challenge is to try to accumulate 1,000,000 points, even if it is possible to exceed that amount. Thus, the points are obtained through a series of individual and group activities. Given that this approach sets in the student a mental idea of reaching a long-term but very specific goal, allowing the student to condition his mentality in making an effort to perform the activities in the best possible way, and thus, try to obtain and accumulate as many points as possible, which upon completion of the course will be redeemed for a final grade; which in practical terms every 100,000 points accumulated equals one point on a traditional 0-10 scale.

Under this scheme more active conduction of the students in the classroom can be proposed, because from 1 to 5 activities can be done that give points per class, according to the topics and their difficulty, in turn, each activity has a dynamic of individual, team and even group work, the class is also raised from the perspective of having brief explanations that will help to carry out activities, and that will provide points by thousands if they are completed.

The factor to take into account in gamification is the reward scheme used by video games, in which depending on the level reached, certain privileges, or additional rewards are offered, Labrador (2016). To give more incentives to the completion of activities, a scheme of 3,000 additional points was implemented in each activity for every 100,000 points accumulated. To keep track of the score, a spreadsheet was generated where the name of the activity, date, score obtained and the total score was recorded, then a bar graph was generated where the scores of each of the students could be compared.

Activities Module

Once the continuous assessment system was established under a gamification scheme, the next part was to establish the types of activities to be carried out during the class, and the type of mechanics to be used, under an Active Learning context. In this case, as the course where it was implemented has theoretical and practical content, it allowed a breakdown of practices and exercises as follows:

- Analysis of each of the topics.
- Types of practices to be carried out in the course.
- Separation of subjects with greater learning problems.
- Classification of topics and exercises of major importance.
- Analysis of the exercises and their learning objective.
- Analysis and classification of activities on an individual basis.
- Group analysis and classification of activities.
- Skill they needed to develop.
- Scheduling of topics per day.

Once this process was done, a brainstorming was generated about the different types of learning methodologies that could be implemented and integrated into each of the activities to be carried out during the course and allow the student to be very active. Then a relationship was made between the activity and different types of learning methods that could be used partially or totally in an activity.

One of the main considerations to take into account in the design of video games has to do with the difficulty in the interaction, so if the levels to play are too easy, then users quickly get bored and see it as a waste of time, if on the contrary, they are too difficult, then they get frustrated or discouraged, Figueroa (2015). So, a strategy that is used when users interact for the first time is to make levels that seem difficult but in reality, they are not.

Therefore, this allows to mentally program and convince the user that he can advance to more difficult levels, improving his self-esteem and encouragement to continue playing, and as he advances in levels the complexity increases in a controlled manner, causing a personal challenge to complete each level in its entirety.

Taking into account all these aspects, it was considered to select common exercises and transform them into problems that affected a local or external context and created small storytelling (story or narration), allowing the student to feel immersed and involved in a fictitious or real situation, thereby seeking the motivation to be involved in the search for solutions, and also allows them to exercise or demonstrate that the knowledge acquired has a practical use and can potentially help them to solve future problems. Each of these problem approaches was called "activities", and these were divided into three levels: simple, medium, or complex, according to the level of complexity and time to carry them out.

Planning and design of a media activity based on Active Learning and Gamification:

1. (Attention-grabbing) - Students are asked to pay attention for 7 minutes for a very concise explanation of how to solve an exercise, which will help shortly to solve problems or activities posed by the teacher.
2. (Building confidence and increasing self-esteem) - A seemingly difficult but simple exercise similar to the example shown is written on the board, which the students have to solve individually.
3. (Satisfaction with achievement) - Review of exercise achieved and time is provided for questions, doubts, and help.
4. (Increased interest) - Afterwards attention is requested for another brief explanation (5-10 minutes maximum) to carry out another exercise that grows in complexity (anecdotes or storytelling can be used).
5. (Uncertainty and personal challenge) - Another individual exercise with greater complexity is carried out.
6. (Knowledge reinforcement, reward) - Review of acquired competence, opportunity to use the skill or knowledge for a purpose is acquired (points can be awarded for its solution).
7. (Social Belonging, prosocial attitude) - Teams are created based on taste, age, skills, etc. When these are formed a reward is proposed in thousands of points depending on the complexity for example 30,000 individual points or perhaps more attractive 90,000 points for a team of three when the entire activity is completed, where the points are divided among all team members, in the case is the same, but it sounds very different the second option, is more attractive and can produce more emotion and commitment among team participants.
8. (Problem-based learning) - A hypothetical situation or problem is posed (storytelling), where the acquired skill is used to reach a solution.
9. (Collaborative Learning) - Each team is asked to isolate itself, and solve the problem early to get their points and beat the other participating teams.
10. (Collaborative Learning) - The problem is given to each team and may be explicit or need to be deduced through clues (search for information in books, digital media, places, etc.), codes, or previously acquired knowledge.
11. (Mobile Learning) - When the solution is found, it can be linked to a mobile application that contains a knowledge reinforcement exercise or quiz on the topic.
12. (Reward) - When the activity is completed and finished, members receive their juicy reward of points, generating an obvious thrill of accomplishment.

It can be observed that the planning of this activity seems too complex, but in reality, it is not, in simple terms it is only to perform several exercises on the same topic but presented differently. What is important is that by performing the activity several times in a different context and with different factors and incentives, uncertainty and emotions are created, which allow meaningful experiences to be had, which raises cognition.

The design of the activity shows in each step that several psychological, and experiential factors and the use of one or more learning methods are being mixed. In the case of the example presented, very general features of Problem Based Learning, Collaborative Learning, and Mobile Learning; all this integration that is under a dynamic based on Active Learning and Gamification shows us the variety of activities that teachers can create; thus this example shown can be used, adapted, modified and adjusted so that a teacher can use it in his/her class. It is important to point out that the teacher when designing an activity of this type needs creative ideas for each one of them, because if only one dynamic activity is used repetitively and continuously, it falls into a routine, and with it, the interest of the student and the teacher is lost. Given this situation, it is advisable to create different activities, vary the number of steps in them, increase or reduce the complexity, and keep track of which ones cause better results and enthusiasm for each particular class.

Results and discussion

The implementation of this new teaching method based on principles of Active Learning and Gamification, allowed us to obtain interesting results. The research was documented through video in different classes, to be able to analyze the behavior, enthusiasm, and change of attitude of the students. At the same time, it was also interesting to know what kind of changes could occur when applying this didactic proposal, regarding teacher-student interaction, student-student interaction, and the type of contextual environment generated in the classroom. Additionally, notes were made on what type of activities, dynamics, and learning methods were more effective and were better accepted.

Working in class with the integration of the method of active learning and gamification, allowed us to

verify initially a better mood in the students when it was proposed that the evaluation of the course was not through exams and tasks, but through the resolution of activities and accumulation of points with a scheme similar to a video game, explaining that this was a continuous evaluation to be fairer and to value their effort throughout the course, Delgado (2006).

Knowing that in each class there could be from 1 to 5 activities that awarded thousands of points, motivated the rate of tardiness and absenteeism to be minimal, and contrary to tradition, the students assumed the responsibility for themselves in case of having an absence or need to be late, they communicated it in advance, requesting, as far as possible, an activity outside class hours, to recover part of the points they would lose if they were not there. As Villalustre (2015) refers, being an active part in a playful environment, allows one to concretize and put into action concepts of everyday life such as promoting responsibilities, experiences, and individual and collective histories.

Concerning what we traditionally know as homework, the strategy used in Inverted Classroom Learning or Inverted Learning, which aims to leave reading or research for home, and practical activities that develop meaningful learning activities are prepared (Report, 2014). Thus, at the end of each class, the topic of the next session was presented, specifying that at the beginning of the next class there would be activities that would make them earn thousands of points if they equip themselves with knowledge of the subject, so without pressing or mentioning the word homework, students performed readings or search for information with the incentive to improve in their collection of points. This attitude was very interesting since at the beginning of the class the students requested the ranking graph and looked for their position on the graph, and then they requested the activities of questions of what they had read to try to climb positions. Thus, at the end of the day, they studied at home beforehand, facilitating the short explanations for the activities to be done.

Another topic of interest observed was the change of behavior in group interaction since in previous courses it had been observed that students did not share their knowledge, and in teamwork regularly ended up displeased with each other, because only some work and the others were indifferent. However, it could be observed that through the different dynamics of individual activities, the students, when finishing before their classmates and obtaining their points, offered to help and explain to their classmates, which fostered a prosocial attitude, which is described by Palmero *et. al.* (2010) as an activity or action of a voluntary nature that provides a benefit and well-being to others, carried out within an environment of social integration. In turn, when working in a team, the sense of social belonging was developed, described by Christakis (2010) as the characteristic of sharing, socializing, and facing situations as a member of a social group with which we identify ourselves.

Although exams were never mentioned in the classes, they were proposed as special activities of medium or complex level, where they had to test their knowledge, and higher scores were awarded, so it was verified that students could perform the proposed activities, demonstrate the skill or competence acquired under an environment without stress, or with the psychological pressure that an exam causes.

This situation was also reflected in an increase in school performance, given that throughout the course an average of 85% had very similar scores with few variations because classroom participation was very homogeneous. The other 15% were slightly below the general average, which encouraged enthusiasm to catch up with their classmates. Some of the attributable causes were setbacks in arriving on time or occasional non-attendance. Differences in scores were minimal because initially, scores were low compared to the points awarded from the middle of the course to the end of the course. Even so, the situation arose that these students began to request additional activities to catch up with their peers in scores. This was something very interesting since in a common way students do not want to do additional exercises or tasks, but in this pilot group, they requested extra activities. The other less frequent case, but which occurred, was when for some reason they were absent or were not able to do extra activities.

At the end of an activity, they would hand in the past activities and ask for questions or explanations to verify that they had understood and comprehended what they had done, for which they only asked for a percentage of the points assigned at the time.

At the end of the course a feedback session was held on what they had found the course, and if the didactics designed under an Active Learning and Gamification environment, had helped them to motivate them in class, to which comments were obtained as:

- *"I liked the way the course was conducted; I was able to see my learning progress in a new and innovative way".*
- *"Interacting with each of my classmates in the different activities, I found it an easy and practical way to learn".*
- *"It made me feel more competitive, effective, and skilled in times of pressure and teamwork."*

The results obtained show us evidence that designing a playful didactic that allows students to be more active can be a very powerful tool, which is a combination of serious learning and fun as Villalustre (2015) states. This experience allowed us to identify what types of activities they liked the most, what kind of approach attracted their attention the most, which learning methods could be adopted or improve their application and above all, how to raise and translate the activities to be carried out in local or known problems., According to Garca (2014), the didactics employed and how practices are carried out have a significant impact on student's motivastudents' onclusions

In this research, we investigated the integration and the essence of Active Learning and Gamification, to generate a pedagogic different from the traditional one. At the same time, we investigated a dynamic of continuous assessment immersed in a gamification scheme based on the accumulation of points. We also investigated the design of activities with different levels of complexity, which, through a series of steps can integrate different learning approaches, involve students more actively, and make them part of the class as Active Learning proposes. This case study can help to reflect on the pedagogical used in a class and create new playful ways to improve and make adjustments in group management, ideas of theory presentation, practical activity, and consider new ways to evaluate and consequently improve school performance. All of this should serve to try to find a point where being in the classroom is enjoyable for both teachers and students.

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