

ENHANCING DIGITAL LEARNING ENGAGEMENT : INVESTIGATING THE IMPACT OF GAMIFICATION STRATEGIES ON STUDENT MOTIVATION AND ACADEMIC PERFORMANCE

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Abstract:

The study aimed to explore how Gamification strategies affect student motivation and academic performance. A mixed research method was employed to achieve this goal. The sample included a control group of 20 students taught using traditional methods, and an experimental group of 20 students trained with gamification strategies. Data analysis involved independent sample t-tests and descriptive analysis. The results revealed a significant difference between the two groups, with the experimental group achieving higher levels of academic performance. Observations also indicated that students exhibited greater motivation for learning through gamification.

Keywords : Digital learning, Gamification, Motivation, Academic performance.

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Introduction :

Many students think that traditional education is pointless and boring. According to Lee & Hammer (2011), there are significant issues with student motivation and engagement in today's schools, despite the fact that educators constantly seek novel instructional approaches. Employing educational games as instructional aids shows great potential because these games possess the capacity to educate while also strengthening essential skills like critical thinking, teamwork, and effective communication. These games hold a noteworthy ability to motivate, employing various techniques to stimulate participation, often without extrinsic incentives, solely driven by the pleasure of playing and the prospect of success. Creating a highly captivating educational game, however, presents challenges in terms of difficulty, time consumption, and cost (Kapp, 2012a). Typically, these games focus on a single set of learning objectives chosen by the game's designer. Additionally,

successful classroom adoption requires specific technical infrastructure and effective pedagogical integration. Instead of opting for intricate designs that demand substantial planning and development efforts, the "gamification" approach suggests incorporating game logic and design elements to enhance student engagement and motivation.

Gamification, a prevalent strategy, involves integrating game components into non-game environments. It holds several advantages over traditional learning methods. By using social mechanisms such as badges, points, or leaderboards, gamification enhances learner engagement, boosts motivation, and improves knowledge retention. In today's technology-driven world, learning and curriculum development naturally intersect with technology. To achieve better student outcomes, educators nowadays increasingly employ cutting-edge digital tools and techniques in their teaching methodologies. Gamification for learning stands out as one of these progressively adopted

approaches by educators worldwide. The incorporation of gamified elements can profoundly impact student engagement and participation, ultimately facilitating more effective learning.

Cheong, Cheong, and Filippou (2013) investigated the effect of gamification on learning, engagement and enjoyment, found that gamification increased student learning level in their study. Ivan Miguel Garcia-Lopez et.al. (2023) investigated the Impact of gamification on Student Motivation, Engagement, and Performance. Results revealed that when students used the gamified platform, motivation influenced behavioral dissatisfaction, which in turn influenced academic performance. On the other hand, when the gamified platform was not used, motivation had a negative effect on academic performance. On the other hand, Elham Alsadoon, Amirah Alkhawajah, Ashwag Bin Suhaim (2022) explored the effects of a gamified learning environment on students' achievement, motivations, and satisfaction. Results indicated that the e-learning gamification environment increased students' motivation to learn computer science ($\alpha < 0.05$) and their satisfaction with the online course ($\alpha < 0.05$) but had no significant effect on their achievement.

Neuroscience of Gamification :

In almost every domain today, psychology finds applications. Psychology involves the scientific exploration of behaviors and mental processes. Various branches of psychology exist, encompassing behavioral psychology, clinical psychology, cognitive psychology, community psychology, comparative psychology, child psychology, adult psychology, developmental psychology, educational psychology, and more. This discussion will delve into the realm of Gamification psychology. This field focuses on studying user behaviors within gamified systems, aiming to comprehend and influence behavior through gaming methodologies. Research indicates that the

brain harmonizes with gamification, prompting the release of dopamine, heightening motivation and enjoyment for players.

Let's explore the interplay between psychology and gamification:

- 1. Emotional Connection:** Gamification establishes an emotional bond between content and learners. Emotions serve as potent tools for learning, enhancing the encoding and retrieval of information. By invoking emotions, gamification profoundly impacts attention, rendering individuals more receptive to learning.
- 2. Hippocampal Role in Recall:** The hippocampus, a brain region, governs information recall. Gamification's positive impact on retention arises from its stimulation of hippocampal memory, facilitating the transfer of new knowledge into long-term memory. Additionally, dopamine release from the hippocampus sustains task focus.
- 3. Storytelling Advantages:** The brain processes stories more efficiently than raw facts. Gamification leverages this cognitive tendency by incorporating storytelling elements, such as backgrounds, characters, and plot twists, enhancing its effectiveness in conveying information.
- 4. Endorphin Release:** Engaging activities, including game playing, prompt the body to produce endorphins, natural pain-relievers that promote relaxation and focus. Gamification strategies amplify endorphin release, fostering an environment conducive to focused learning.
- 5. Brain Health Benefits:** Games encourage neuroplasticity, the brain's capacity to respond to stimuli and forge new connections. This training fortifies neural pathways, enhancing cognitive skills like memory and attention, fostering creativity and problem-solving abilities, and potentially mitigating age-related cognitive decline.

Research problems :

1. To explore the various gamification strategies implemented in digital learning platforms.
2. To investigate the impact of gamification strategies on students motivation in digital learning environment.
3. To assess the effect of gamification on academic performance such as test scores.
4. To compare the effectiveness of gamification with traditional digital learning approaches in terms of students outcomes.

Methodology : Present study adapts the mixed method research. Mixed method research is a method in which both qualitative and quantitative data is utilized to accomplish the purpose of the research. Gamification strategy was applied in the education and motivation and effectiveness were evaluated. It was a three day study. Every day an achievement was conducted on the basis of content taught and results were analysed. A group of 40 students was selected for the study by purposive sampling method. Further, the group was divided into two groups of 20-20 students. Experimental group of 20 students were exposed to a gamified digital learning platform, and the other controlled group was exposed to non-gamified learning platform. A three day observation and teaching was conducted on both the groups through their respective methods, i.e, Traditional and Gamification. After the experiment, academic performance data such as achievement test scores were collected from both the controlled and experimental group to assess the effect of gamification on academic performance. Further, the test scores of both the groups were compared with the help of t-test to check the effectiveness of gamification with traditional digital learning approaches in terms of students outcomes. Various gamification strategies implemented in digital learning platforms were explored with the help of secondary data. For investigating the impact of gamification strategies on

students motivation, observation technique was applied.

Sampling and Implementation process : The sample of the study was composed of 40 fifth grade students of a CBSE school in Aurangabad city, Maharashtra. A unit on “Our Environment” was taught to the 20 students in the experimental group using gamification strategies and to the students of control group, the same content was taught using traditional method. A period of three day was utilized for the study in which daily 45 minutes were given to teach the content to both the groups. Elements of Gamification were added in the content of experimental group such as competition, rewards, badges and group work.

Data Collection tools : In the present study, an achievement test, observation technique and secondary data were used as data collection tool. Achievement test was developed by the researcher on the basis of taught content. Moreover, a project work was also given to both the groups to compare their knowledge and understanding.

Analysis and Interpretation of Data : The present study was conducted for three days to observe the motivation of students and to check and compare the academic performance of both the group. With the help of statistical measure like Mean and t - test, the scores of both the groups were compared. Results of both the controlled and Experimental group are mentioned below according to the objectives of the study.

1. To explore the various gamification strategies implemented in digital learning platforms.

Several gamification strategies are integrated into digital learning environments, with some of the most popular ones being:

1. Point Systems: Allocating points for accomplishing various tasks can serve as a motivational tool, spurring individuals to invest significant effort. Additionally, point systems offer a tangible measure of progress, reflecting

the advancements made throughout a course or lesson.

2. **Badges:** Badges are an excellent means of recognizing and rewarding individuals for their diligence. These virtual tokens, represented as images on profiles, effectively convey appreciation for the hard work and dedication invested in tasks.
 3. **Leaderboards:** Leaderboards foster healthy competition among students. As individuals strive to secure a prominent position on the leaderboard, they become more driven to excel. The possibility of establishing distinct leaderboards for different teams enhances the competitive spirit within smaller groups.
 4. **Challenges:** Challenges present tasks that require individuals to invest time and effort, yet failing or completing them incorrectly does not result in negative consequences. These challenges often integrate learning strategies such as problem-solving, prompting participants to think creatively to devise solutions.
- Furthermore, other gamification techniques can

involve an element of surprise, maintaining excitement. This approach entails enabling users to "unlock" specific features or content within the game upon successful completion of tasks.

2. To investigate the impact of gamification strategies on students motivation in digital learning environment.

Observation technique has been used to investigate the impact of gamification strategies on students motivation in digital learning environment. To analyze the students motivation, elements like engagement level in class, students enthusiasm for learning, students persistence in completing task, their willingness to participate, and the extent to which they set and achieve goals were observed. According to the researchers observation, the students engagement level and enthusiasm in class was quite overwhelming as this was something new for them. Students completed the task assigned to them quite happily and enthusiastically. Their willingness to participate in the activity was also high. Overall, the students motivation in digital learning environment was quite diligent and energetic.

3. To assess the effect of gamification on academic performance such as test scores.

| Activity | Mean of controlled group | Mean of Experimental group |
|----------|--------------------------|----------------------------|
| Day 1 | 6.5 | 7.8 |
| Day 2 | 3.15 | 3.8 |
| Day 3 | 3.45 | 5.2 |

Table 1 reflects the mean score of Experimental group as higher in all the activities. It shows that the academic performance of experimental group is better than the controlled group.

5. To compare the effectiveness of gamification with traditional digital learning approaches in terms of students outcomes.

| Group | N | Mean | t value | Difference between Mean. |
|---------------------|----|-------|---------|--------------------------|
| Experimental group. | 20 | 13.35 | 3.83 | Significant |
| Controlled group. | 20 | 16.15 | | |

Table 2 reveals that the mean value of experimental group is 13.35 and mean value of controlled group is 16.15 respectively. Obtained t value is 3.83 which is more than the table value 2.02 at 0.05 level of significance. Therefore, there is significant difference between the mean scores of Experimental and controlled group. It means that Gamification method is more effective than the traditional method of teaching.

Conclusion And Discussion : In the present study, mixed method research was adopted. Both the Qualitative as well as Quantitative methods were used to achieve the objectives of the study. The purpose of the study was to investigate the effect of gamification on students motivation, to assess the effect of gamification on academic performance, to compare the effectiveness of gamification with traditional method and to explore various gamification strategies. The experimental group students, who were taught using the gamification method, earned better achievement scores than the control group students. According to the qualitative data obtained in the study through observation technique, the motivation level of the experimental group was found to be on the higher level. In conclusion, gamification positively influences student motivation and engagement. When learning is gamified, students tend to be more attentive and engaged, akin to a game environment with clear objectives. This approach sets distinct learning goals, imparting a sense of purpose and direction. Gamification also grants students a level of autonomy, empowering them to choose routes and strategies toward goals. This autonomy, coupled with the satisfaction of surmounting challenges, notably boosts motivation. Designing a progressively intricate gamified curriculum enables educators to sustain student interest over time, averting monotony and upholding motivation.

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