



EFFECTIVENESS OF GAMIFICATION ON ACADEMIC EMOTIONS AMONG SCHOOL STUDENTS – A MIXED METHOD STUDY

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Abstract:

The present study investigates the effectiveness of gamification-based instructional design on academic emotions among secondary school students through a mixed-method research approach. Recognizing the pivotal role of academic emotions in influencing student motivation, engagement, and academic performance, the study integrates game elements—such as badges, leaderboards, and levels—into the science curriculum for Grade IX students. A total of 95 participants (Control = 52 and Experimental = 43) from two secondary schools were selected using purposive sampling and divided into control and experimental groups. Quantitative data were collected using a validated Academic Emotions Questionnaire, while qualitative insights were obtained through focus group discussions, journal entries, and semi-structured interviews. Statistical analysis revealed a significant improvement in the academic emotions of the experimental group following the gamified intervention. Thematic analysis of qualitative data further supported these findings, indicating enhanced emotional clarity, engagement, and motivation. The study concludes that gamification, when systematically integrated into instructional design, serves as an effective pedagogical tool for fostering positive academic emotions and improving the overall quality of the teaching-learning process.

Keywords: *Gamification, Academic Emotions*

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Introduction:

Emotions play an important role too. Powerful emotions such as pride, joy, optimism, curiosity, and frustration are experienced during the game (Faiella & Ricciardi, 2015). Granic et al. (2014) state that previous research on gamification has primarily focused on the negative effects, such as violence, addiction, and depression, experienced by players. However, gamification has become more diverse, realistic, and social in nature in recent years. Gamification impacts all domains, including cognitive, motivational, emotional, and social ones.

The emotions a student experiences in various academic settings, such as those related to different situations—learning, class, and tests—are considered academic emotions. According to control-value theory (Pekrun, 2016), learners subjectively control these

emotions and perceive their value. Research indicates a correlation between academic emotions and both academic achievement and motivation. Students who exhibited higher levels of positive emotions and self-regulation achieved better grades, whereas lower levels of pride and self-regulation were associated with lower grades and reduced engagement (Villavicencio & Bernardo, 2013). The study's findings suggest that engaging students in learning requires consistent positive emotional experiences. These experiences influence the classroom climate, form a strong foundation for teacher-student relationships, and are necessary for healthy interactions and motivation to learn (Meyer & Turner, 2006). Research findings based on qualitative studies (Pekrun et al., 2002) emphasized that, in academic activities, students experience a wide range of emotions that depend on the context of the

academic situation. Academic emotions have a direct impact on students' academic engagement and achievement. These emotions significantly impact students' school life. In the study of Pekrun et al. (2005), academic emotions are classified into nine categories: enjoyment, hope, pride, relief, anger, anxiety, hopelessness, shame, and boredom. and are broadly classified under three dimensions: valence (positive vs. negative), activation level (activating vs. deactivating), and object focus (activity vs. outcomes). Some evidence indicates that in both human and non-human subjects, a positive stimulus reinforces emotion-driven learning (Phelps, 2006). The game elements of the game design provide an immersive and memorable environment, which harnesses the emotions and enhances cognitive-emotional processes, which helps to achieve the learning goals by sharpening the memory. During a state of total immersion in a game, greater levels of anxiety and other negative emotions are experienced, which is suggested to increase levels of engagement (Jennett et al., 2008).

Need for the Study:

Most of the studies conducted earlier were of quantitative nature with reference to impact of gamification on academic emotions. The researcher noticed the absence of qualitative research in this area. Thus, a need was felt by the researcher to study the qualitative aspect too. There was a shortage of studies in the area of impact of different gamification elements on academic emotions. Most of the studies, considered gamification as a strategy to achieve the learning objectives. Lesser studies had been done with the influence of gamification on students' academic emotions. In this study, the researcher wanted to study impact of different gamification elements on academic emotions. The researcher studied the students' experiences, their feelings, perceptions based on each gamification elements.

The researcher felt that using the game elements to a non-game situation, gamification; could be used to make the learning process more interactive. Gamification strategy which includes several game elements such as levels, clear goals, game design, value consciousness, challenges, badges and leader boards help the student to enjoy the learning process while staying grounded in reality (Landers & Landers, 2015). It helped the researcher to evaluate the anticipated objectives and hypotheses. It was felt that through the use of Gamification, a partial solution could be provided to the decline in learners' academic emotions which is experienced presently in the schooling system (Alsawaier, R., & Alsawaier, R.,2017). The researcher felt that as social beings everybody loves games. Gamification, besides games includes elements which creates the necessary learning conditions. It also provides the avenues for logical thought provoking and meaningful learning. The use of simulation and gaming techniques to enhance our understanding, not of warfare, but rather of the process whereby peace might be achieved and sustained (Brynen & Milante, 2013). Based on the previous studies (Tan & Hew, 2016), the researcher felt that, gamification is a strategy used by the teachers to teach the topic effectively with interactive elements. Thus, the researcher believes that positive academic emotions would increase the academic achievement of high school students.

Statement of Problem:

Effectiveness of Gamification on Academic Emotions Among School Students—Mixed-Methods Study

Operational Definitions:

1. Gamification based instructional design - In this study, gamification-based instructional design is an interactive teaching strategy developed by the researcher with game elements, such as badges, leaderboards, levels, etc., for standard 9th SSC board students in the subject of science to improve their academic emotions.

2. Academic emotions - In this study, academic emotions deal with the various positive and negative feelings and expressions that are experienced by the school students of St. IXth in the subject of science during the gamification-based instructional design.
3. School students - In this study, school students refer to students belongs to Std IX from secondary schools of the State Board located in Greater Mumbai city of the state of Maharashtra.

Objectives of the Study:

1. To compare the Pre-test academic emotions, mean score and Post-test academic emotions mean score of Control school group students.
2. To compare the Pre-test academic emotions, mean score and Post-test academic emotions mean score of Experimental school group students.

Hypotheses of the Study:

1. There is no significant difference between Pre-test academic emotions mean score and Post-test academic emotions mean score of Control school group students
2. There is no significant difference between Pre-test academic emotions mean score and Post-test academic emotions mean score of Experimental school group students.

Data Analysis:

The following data analysis methods were adopted in this study:

1. Quantitative data were analyzed using SPSS to identify patterns and statistical significance, employing measures such as central tendency, variability, tests for normality, and paired t-tests.
2. Qualitative data were analyzed thematically to interpret students' experiences and perceptions through systematic coding and thematic analysis.

Analysis and Discussion:

Hypothesis 1

There is no significant difference between Pre-test academic emotions mean score and Post-test academic emotions mean score of Control school group students.

academic emotions mean score of Experimental school group students.

Research Design:

An explanatory mixed-methods approach: combining quantitative and qualitative techniques, with the primary focus on the quantitative part first, followed by the qualitative part to help explain or interpret the quantitative findings more deeply.

Sample of the study:

The study selected two secondary schools. Students from Grade IX participated. The researcher used purposive sampling to select students with similar demographic characteristics.

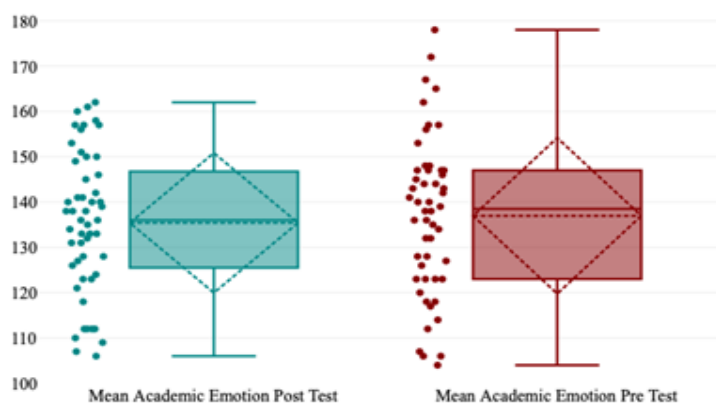
Tools used for the study:

To assess the academic emotions of students, the researcher developed an Academic Emotions Questionnaire. The validity of the questionnaire was established through content validity, and a pilot test was conducted to determine its reliability. Reliability was measured using Cronbach's Alpha, and the questionnaire yielded a Cronbach's Alpha coefficient of 0.78. Focus groups discussion and semi-structured interviews were used for collecting qualitative feedback.

	Pre- Post Control Groups	N	Mean	Std. Deviation	Std. Error Mean	Paired t-test value	p
Mean Academic emotions	Pre-test Control Group	52	136.96	17.36	2.41	0.62	p > 0.05
	Post-test Control Group	52	135.4	15.57	2.16		

df =51

Figure 1. Box plot graph shows the Comparison of Mean Academic Emotions Scores in Post-Test and Pre-Test of Control group.



The table 1 presents the descriptive statistics for the Mean Academic Emotions Pre-Test score and Post-test score of the Control group, including the sample size, mean, standard deviation, and standard error of the mean. The Control Group comprises 52 participants, with a mean academic emotions pre-test score of 136.96 (SD = 17.36), whereas the post-test score is with a mean score 135.4 (SD = 15.57). The standard error of the mean (SEM), which reflects the precision of the sample mean as an estimate of the population mean, is 2.41 for the pre-test Control Group and 2.16 for the post-test control Group.

A paired t-test was conducted to examine whether there was a statistically significant difference between the pre-test and post-test mean scores of academic emotions of the Control Group. The results indicated that the difference was not statistically significant, $t(51) = 0.62$. Consequently, the null hypothesis, which posits no significant difference in mean academic emotions pre-test and post-test scores of the control group, was not rejected. Furthermore, the

obtained t -value (0.62) was lower than the critical value (2.008) at the 0.05 significance level, providing additional support for the conclusion that there was no statistically meaningful difference between the pre-test and post-test means scores of the Control Group.

Hypothesis 2

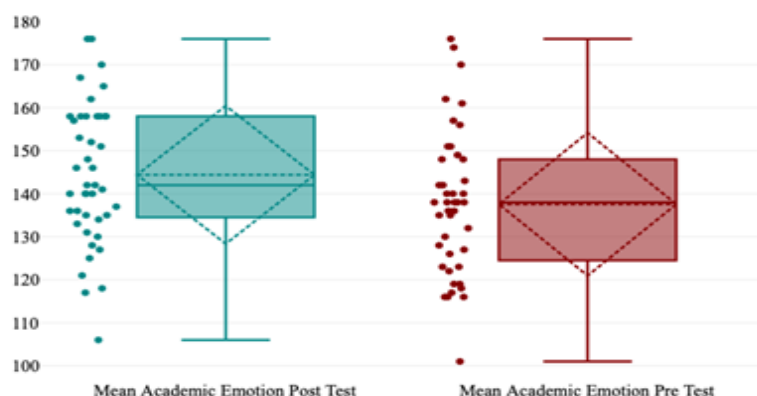
There is no significant difference between Pre-test academic emotions mean score and Post-test academic emotions mean score of Experimental school group students.

Table 2. Mean Academic Emotions Pre-Test score and Post-test score of the Experimental group.

	Pre- Post Experimental Group	N	Mean	Std. Deviation	Std. Error Mean	Paired t-test value	p
Mean Academic Emotions	Pre-test Experimental Group	43	137.56	16.8	2.56	2.56	p < 0.05
	Post-test Experimental Group	43	144.4	16.23	2.47		

df = 42

Figure 2. Box plot graph shows the Comparison of Mean Academic Emotions Scores in Post-Test and Pre-Test of Experimental group.



The table 2 presents the descriptive statistics for the Mean Academic Emotions Pre-Test score and Post-test score of the Experimental group, including the sample size, mean, standard deviation, and standard error of the mean. The Experimental Group comprises 43 participants, with a mean academic emotions pre-test score of 137.56 (SD = 16.8), whereas the post-test score is with a mean score 144.4 (SD = 16.23). The standard error of the mean (SEM), which

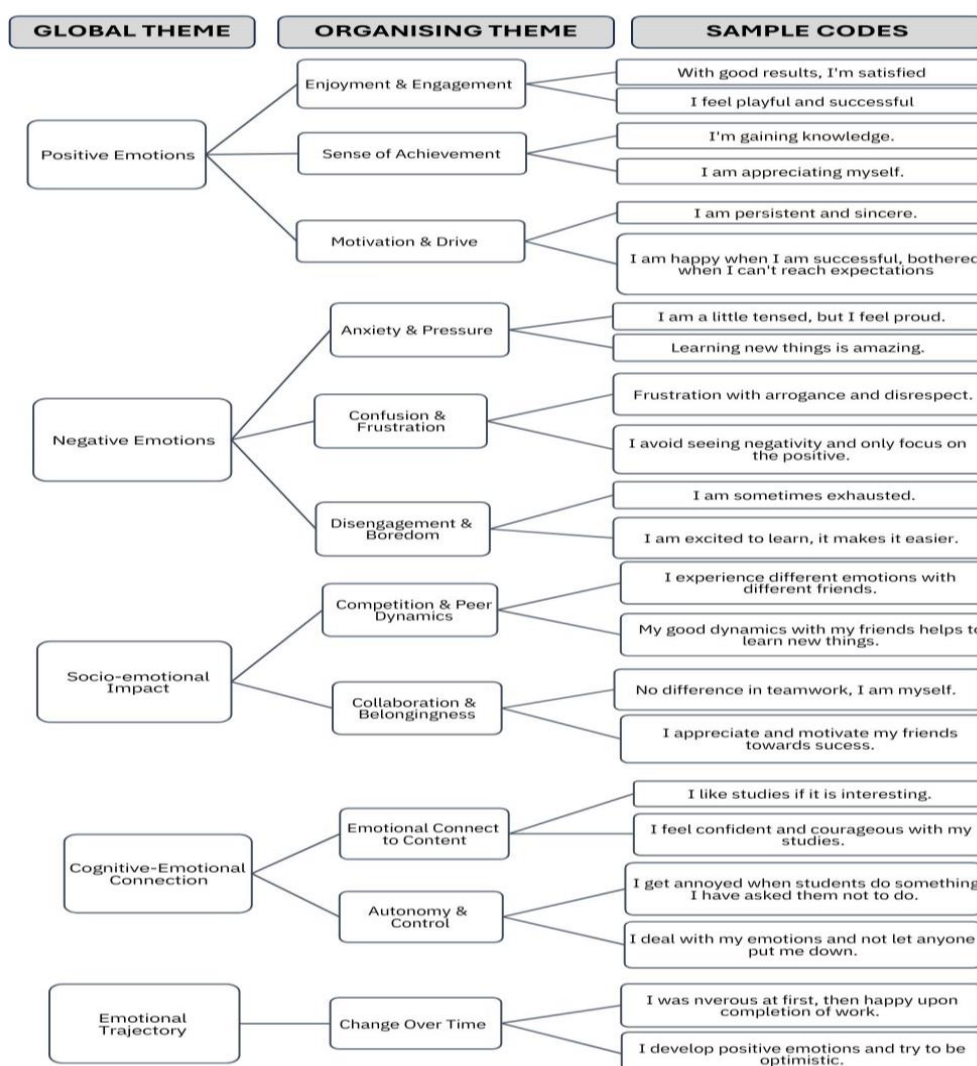
reflects the precision of the sample mean as an estimate of the population mean, is 2.56 for the pre-test Experimental Group and 2.47 for the post-test Experimental Group.

Paired t-test was conducted to examine whether there was a statistically significant difference between the pre-test and post-test mean scores of academic emotions of the Experimental Group. The results indicated that the difference was statistically significant, $t(42) = 2.56$. Consequently, the null hypothesis, which posits no significant difference in mean academic emotions pre-test and post-test scores of the Experimental group, was rejected. Furthermore, the obtained t -value (2.56) was higher than the critical value (2.008) at the 0.05 significance level, providing additional support for the conclusion that there was statistically meaningful difference between the pre-test and post-test scores of the Experimental Group.

Qualitative Data Analysis:

Qualitative data was collected through open questionnaire, semi structured and focussed group discussion. Based on the qualitative data, sample codes , categories and themes are identified. The conclusion is represented as diagram

Figure 3. Qualitative feedback on the Impact of Gamification on Academic Emotions



Discussion:

The present study reveals the Effectiveness of Gamification based instructional design on academic emotions among secondary students. The impact of the intervention program towards academic emotions of the experimental group is analysed with respect to the comparison of the pre-test and post-test scores.

The results of the present study demonstrate a statistically significant enhancement in academic emotions following the implementation of a gamified learning intervention. The Experimental Group exhibited an increase in mean scores from the pre-test ($M = 137.56$, $SD = 16.8$) to the post-test ($M = 144.4$, $SD = 16.23$), with a paired-samples t -test revealing a significant difference $t = 2.56$. This supports the rejection of the null hypothesis and suggests that the gamified instructional approach effectively fostered more positive academic emotions among learners. Findings from the previous study reveal that the post-test scores of the experimental group are comparatively better than their pre-test scores. The findings show that students who experienced gamification-its elements and mechanics; scored better in their post-test. Thus, the gamified methodology is much more motivating than the traditional methodology of teaching-learning process, irrespective of the demographic differences. This is supported by the previous research (Redondo-Rodríguez et al., 2022, Villavicencio & Bernardo, 2013) which states that gamification is a positive tool to enhance the emotional intelligence of the learners; besides increasing life goals and learning strategies. For instance, Hamari et al. (2014) found that gamified learning environments can significantly increase motivation and positive emotions, particularly when game elements such as points, badges, and leaderboards are aligned with pedagogical goals. Another purpose is also to identify the students'

perception of the impact gamification have on their individual and group learning through the use of various gamification elements. Also, the research used the intervention program as an offline strategic tool to ascertain the fact that gamification can be incorporated without the use of expensive software and technology. This supports the findings presented by the previous research (Papp & Theresa, 2017) which is also a mixed research study; to analyse the effects of gamification on motivation and learning, consequently with the positive influence of academic emotions. Deterding et al. (2011) emphasized that gamification enhances user engagement by tapping into intrinsic motivators, which can elevate learners' enjoyment and emotional investment in academic tasks. Domínguez et al. (2013) conducted a controlled study showing that gamification led to greater satisfaction and enjoyment in learning, directly linking such emotional gains to improved learning outcomes. Mekler et al. (2017) further demonstrated that gamification can elicit positive emotions like curiosity, pride, and enjoyment—factors that are crucial for sustained academic engagement.

In the effort to study the stimulation received by the learners, thereby engaging their attention fruitfully, simple games are incorporated in the present study. This helps in investigating the magnitude of the interest generated through their flow of experience and interaction. It proves that there is a tremendous interest developed amongst the students, subsequently developing a 'WIN-WIN' attitude among them. This is supported by the previous research (Malyakkal, 2014), which investigated through a questionnaire the interest generated and performance in learning before and after the game.

The study analyses the statistical scores to highlight the impact of gamification on academic motivation. This is done by comparing the pre-test and post-test scores of

the participants of the Experimental group. It can be concluded that there is a significant difference between the pre-test and post-test scores of the experimental group.

The observed increase in the mean post-test score and the reduction in standard error (from 2.56 to 2.47) indicate not only a general improvement in academic emotions but also a relatively consistent impact of the gamified intervention across participants. This supports the idea that well-structured gamification can serve as a powerful emotional regulator in learning environments (Kuo & Chuang, 2016). These findings also echo Pekrun's (2006) control-value theory, which posits that positive academic emotions stem from a sense of control and value in the learning process—both of which are enhanced through the motivational affordances of gamified systems.

The qualitative responses revealed that Gamification in learning triggers a spectrum of emotional responses—both positive and negative. It fosters engagement, motivation, and a sense of achievement, while also presenting challenges like pressure or confusion. Social dynamics and emotional-cognitive connections play crucial roles, and over time, learners tend to develop a more optimistic emotional outlook through gamified experiences.

In conclusion, the integration of gamification into the learning process appears to be an effective method for improving students' academic emotional experiences. Future research should consider longitudinal studies to evaluate the sustained impact of gamification and explore its differential effects across various learner profiles and subject areas.

Conclusion:

There is a significant difference in the mean value between Pre-test scores of the experimental group of Academic Emotions and Post-test scores of experimental groups of Academic Emotions that have been analyzed through both the quantitative and

qualitative (thematic) analysis. The results obtained through descriptive and inferential analysis, focused group discussions, personal interviews, questionnaires and observation data have been analyzed to conclude the above findings. It was clearly evident that academic emotions is the key category which showed a striking dominance in the researcher's study.

Acknowledgment:

This paper is part of the author's ongoing Ph.D. research at University of Mumbai, under the supervision of Dr. Bijoy K Thomas.

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Cite This Article: Kadam P. V. (2026). *Effectiveness of Gamification on Academic Emotions Among School Students – A Mixed Method Study. In Aarhat Multidisciplinary International Education Research Journal: Vol. XV (Number I, pp. 46–54)*