

An Empirical Evaluation of E-Gaming on the Academic Performance of Junior High School Students

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Abstract— Adaptive learning tools customize content and tasks to suit individual learning styles and needs, ensuring students remain engaged and appropriately challenged. Gamified platforms offer immediate performance feedback, enabling students to pinpoint areas for enhancement and celebrate successes, nurturing a feeling of achievement. This study aims to investigate junior high school students' perspectives regarding the influence of electronic gaming on their academic achievements. Specifically, the study targeted the students of junior high schools residing in Rohtak city, Haryana. A carefully designed questionnaire was employed to gather data from the study participants. A random sample of 550 respondents received the questionnaires, resulting in the collection of 520 responses. Following a validation process, 500 responses were deemed suitable for analysis. The analysis involved a comprehensive examination of the data using various statistical techniques facilitated by software tools like MS Excel and SPSS. The study suggests that e-gaming applications can potentially enhance specific skills like calculation, creativity, and curiosity. This could lead to improved academic performance in subjects related to these skills. While the study suggests some benefits of electronic gamified applications, it is crucial to consider the type and design of the games. Not all e-gaming experiences are created equal, and some might have negative impacts on academic performance or other aspects of well-being. The study highlights the need for more in-depth research to explore the specific types of e-gaming applications, their impact on different academic subjects and skills, and potential negative effects.

Keywords— E-gaming, academic performance, high school students, technology, India

I. INTRODUCTION

Technological advancements have given rise to novel educational approaches that enhance student engagement and enjoyment in learning. Among these, gamification has become increasingly popular for its ability to boost motivation and make learning more stimulating. This strategy, widely adopted in universities and schools, employs elements such as points, badges, leaderboards, and challenges to leverage our innate drive for competition and accomplishment. This fosters active participation and allows for easy monitoring of progress. Quizzes, simulations, and interactive narratives convert passive learning into active discovery, encouraging curiosity and facilitating deeper comprehension. Adaptive learning tools customize content and tasks to suit individual learning styles and needs, ensuring students remain engaged and appropriately challenged. Gamified platforms offer immediate performance feedback, enabling students to pinpoint areas for enhancement and celebrate successes, nurturing a feeling of achievement (Shaheen, 2020). The concept of "gamification" was coined in 2008 but did not become widely popular until later. Prior to its formal recognition, game-like elements were already being incorporated into non-gaming contexts, showcasing the natural appeal of gaming mechanics for enhancing engagement. Alternate Reality Games (ARGs) represent a distinct form of gamification that integrates real-world settings with digital components, resulting in an immersive mix of play and education where ordinary surroundings serve as the game's backdrop. Participants actively engage with their surroundings, searching for clues and accomplishing tasks, which nurtures a

genuine curiosity. ARGs require problem-solving skills, critical thinking, and teamwork, leading to a more profound learning experience compared to passive methods (Poonam et al., 2022). In one such game, players embark on a worldwide espionage mission, gaining insights into landmarks and history as they complete missions. Although primarily for entertainment, it also encourages exploration of local areas and learning about actual wildlife. To be successful, ARGs must have well-structured storylines, compelling challenges, and explicit educational goals to avoid being seen as mere novelties (Deterding et, 2011). Gamification involves using the motivational aspects of games and applying them to non-game settings. It entails incorporating the enjoyable and engaging elements of games into contexts beyond entertainment to achieve specific objectives. While traditional games are primarily for leisure, offering enjoyment and a break from reality, gamification adapts elements like points, badges, leaderboards, challenges, and rewards for other purposes. When applied to learning, this approach can enhance interactivity and customization, resulting in better retention and practical application of knowledge. Gamification can also incentivize desirable behaviors, such as adopting healthy habits, supporting environmental sustainability, or boosting productivity. In educational settings, gamified platforms are revolutionizing teaching methods by making learning more interactive and enjoyable, leading to increased engagement and academic success. Utilizing gamification in training programs can enhance employee engagement, boost retention of knowledge, and expedite skill development. These systems can encourage positive behaviors, such as efficient task completion, effective

collaboration, and meeting deadlines. In the realm of fitness, gamified apps and health challenges can inspire individuals to adopt healthier lifestyles, increase physical activity, and manage chronic conditions (Rathee et al., 2023). The widespread integration of technology-based games in modern society suggests that engaging in activities supported by play can enhance motivation levels. As a result, the application of computer technologies to influence human behavior aims to facilitate, organize, and motivate training activities by offering exemplary approaches. (Hamari & Koivisto, 2014). The most effective gamified learning experiences extend beyond merely adding game elements to a passive task. When implemented thoughtfully, gamification has the potential to significantly enhance motivation and learning by leveraging the fundamental structural components of games that resonate with learners. Well-designed games incorporate escalating levels of difficulty, ensuring learners remain engaged and motivated to master the material. As learners progress through these levels, they unlock new content and rewards, fostering a sense of achievement and expertise. For instance, Duolingo employs adaptive learning techniques to tailor challenges according to individual progress, ensuring learners stay engaged and appropriately challenged. This approach allows learners to influence their learning journey, making it more meaningful and compelling. Similarly, Kahoot! provides instant feedback on quiz responses, enhancing the interactive and enjoyable aspects of learning. Gamification also fosters self-regulation in students by offering opportunities for self-assessment, thus establishing clear expectations. Furthermore, gamification promotes problem-solving skills, which can significantly enhance students' motivation to learn. (Gressick & Langston, 2017).

This study aims to investigate junior high school students' perspectives regarding the influence of electronic gaming on their academic achievements.

II. LITERATURE REVIEW

Elnady (2020) explores how gamification can boost creative thinking in science education. The study involved two groups: one using gamified science learning (experimental) and the other using traditional methods (control). Creative thinking skills were evaluated verbally before and after the intervention. The sample comprised 134 students (68 in the experimental group, 66 in the control group). Results indicated that the experimental group exhibited significant enhancements in their overall creative thinking abilities compared to the control group. Additionally, the participants showed enhancements in all specific creative thinking skills assessed by the Torrance Test. The research suggests integrating gamification into science education as a means to cultivate creative thinking abilities among young students. Al-Juhani's (2018) study contributes to the expanding research on gamification in education, specifically focusing on enhancing mathematical problem-solving skills. The study investigated whether using gamified learning with a digital blackboard could improve mathematical problem-solving abilities in gifted first-grade secondary school students compared to conventional approaches. The study involved comparing two groups: one utilizing gamified learning with a digital blackboard

(experimental) and the other using conventional methods (control). Both groups were evaluated before and after the intervention. The sample consisted of 36 students (16 in the experimental group, 20 in the control group). Results indicated that the experimental group exhibited significant enhancements in their mathematical problem-solving abilities compared to the control group. These findings suggest that employing gamified learning with a digital blackboard can be an effective approach for enhancing these skills in talented students. The research recommends integrating gamified learning into mathematics education to enhance problem-solving skills. Shaheen's (2020) research contributes to the expanding body of knowledge on gamification in education, particularly its effects on classroom management and student academic achievement in basic education. The study aimed to determine if a gamified learning environment created through an electronic application could enhance both classroom management and student academic performance in basic education. It specifically focused on these two aspects and employed a particular electronic application designed for gamification. The findings suggest that the gamified application was effective in managing both classroom and extracurricular learning environments. The research also indicates a positive impact on the academic performance of the participants, suggesting that well-designed gamified applications could be beneficial for both classroom management and student learning. In another study, Ahmed et al. (2022) examined the effects of Kahoot, a game-based learning application, on Iranian students learning English as a foreign language (EFL), specifically focusing on vocabulary recall and retention. The study involved 50 Iranian students with intermediate English proficiency. It aimed to determine whether using Kahoot for vocabulary learning resulted in better recall and retention compared to traditional methods. Half of the students, referred to as the "experimental group," learned new vocabulary through Kahoot games. The remaining half, known as the "control group," were taught new vocabulary through traditional means. Both groups underwent 10 sessions of vocabulary learning. Following these sessions, all participants took a vocabulary test immediately. Three weeks later, both groups were tested again to evaluate retention. The results revealed that students who used Kahoot (experimental group) performed notably better on both the immediate and delayed vocabulary tests compared to those who were taught using traditional methods (control group). This indicates that Kahoot can be an effective tool for enhancing vocabulary recall and retention among Iranian EFL learners. Pellas & Mystakidis (2020) extensively examine the potential of game-based learning (GBL) in virtual worlds (VWs) to enhance student learning and satisfaction. The research notes a significant increase in GBL within VWs from 2014 to 2016, with numerous studies assessing its efficacy in both K-12 and higher education environments. Going beyond existing literature, this study delves into how GBL methods in VWs can improve student learning outcomes, satisfaction levels, and comprehension of specific subjects. It also offers six practical recommendations for designing and implementing games that effectively support learning in VWs.

A. Research objective

The present study aims to analyse the impact of e-gaming on the academic performance of junior high school students.

III. RESEARCH METHODOLOGY

This research adopts an empirical approach, drawing on both primary and secondary data from a range of reputable sources, such as newspapers, journals, and official websites. The sample selection process was carefully conducted, utilizing a combination of purposive and convenience sampling methods to ensure representation from the broader population (Solanki & Chhikara, 2023). Specifically, the study targeted the students of junior high schools residing in Rohtak city, Haryana. A carefully designed questionnaire was employed to gather data from the study participants. A random sample of 550 respondents received the questionnaires, resulting in the collection of 520 responses. Following a validation process, 500 responses were deemed suitable for analysis. The analysis involved a comprehensive examination of the data using various statistical techniques facilitated by software tools like MS Excel and SPSS. This included the application of methods such as tabulations, frequency distributions, percentage calculations, and other relevant analytical procedures to derive meaningful insights from the dataset.

IV. ANALYSIS AND DISCUSSION

Table 1 provides a snapshot of the demographic characteristics of the respondents, focusing on gender

distribution and annual family income. In terms of gender, the respondents were fairly evenly split, with 60% being boys and 40% being girls. This indicates a relatively balanced representation of both genders in the sample. When considering annual family income, the majority of families fell within the middle-income brackets, with 40% reporting an income between 500,000 and 1,000,000 INR, and 30% reporting an income between 1,000,000 and 2,000,000 INR. A smaller proportion of families had lower incomes below 500,000 INR (24%), while only 6% reported incomes above 2,000,000 INR. This distribution suggests that the sample is diverse in terms of income levels, encompassing a range of socioeconomic backgrounds.

TABLE 1. Demographic profile of the respondents

Category	Sub-category	Frequency	Percentage
Gender	Boys	300	60
	Girls	200	40
	Total	500	100
Annual Income of family (in INR)	Below 500000	120	24
	500000-1000000	200	40
	1000000-2000000	150	30
	Above 2000000	30	6
	Total	500	100

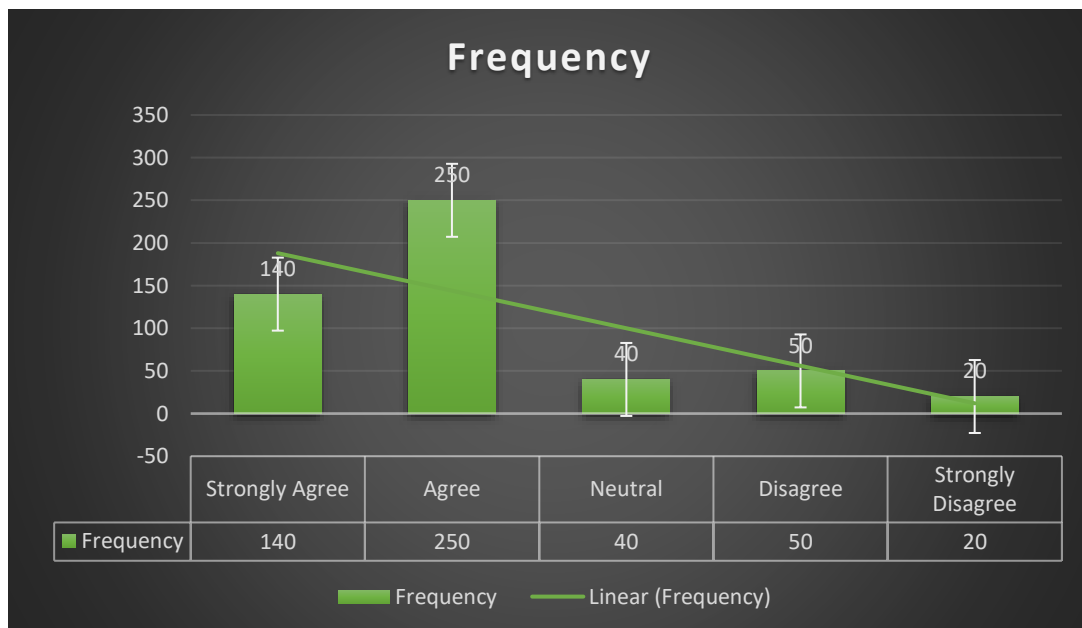


Figure 1. I believe that using electronic gamified applications is an effective way to develop calculation skills.

Source: Researcher's calculations

Figure 1 illustrates the respondents' opinions on the effectiveness of using electronic gamified applications to develop calculation skills. The majority of respondents either agreed or strongly agreed with this statement, with 140 individuals (28%) strongly agreeing and 250 (50%) agreeing. This suggests a high level of confidence in the efficacy of electronic gamified applications for enhancing calculation

skills among the respondents. However, there is a notable proportion of respondents who expressed neutral or negative views. Forty respondents (8%) were neutral, indicating a lack of strong opinion either way. On the other hand, 50 respondents (10%) disagreed and 20 (4%) strongly disagreed with the statement, implying some skepticism or disagreement with the notion that electronic gamified applications are effective for

developing calculation skills. Despite these differing opinions, the overall trend indicates a positive perception of the effectiveness of electronic gamified applications for improving calculation skills among the respondents.

Figure 2 depicts the respondents' perspectives on the role of electronic gamified applications in fostering creativity. The data shows a generally positive outlook, with a significant number of respondents indicating agreement with the statement. Specifically, 150 respondents (30%) strongly agreed and 240 (48%) agreed that electronic gamified applications help to develop creativity. This suggests a widespread belief among the

respondents in the potential of these applications to enhance creative thinking. However, there is also a noticeable portion of respondents who expressed neutral or negative views. Sixty respondents (12%) were neutral, indicating a lack of strong opinion on the matter. Additionally, 30 respondents (6%) disagreed and 20 (4%) strongly disagreed with the statement, suggesting some skepticism regarding the ability of electronic gamified applications to foster creativity. Despite these differing opinions, the overall trend indicates a positive perception of the role of electronic gamified applications in promoting creativity among the respondents.

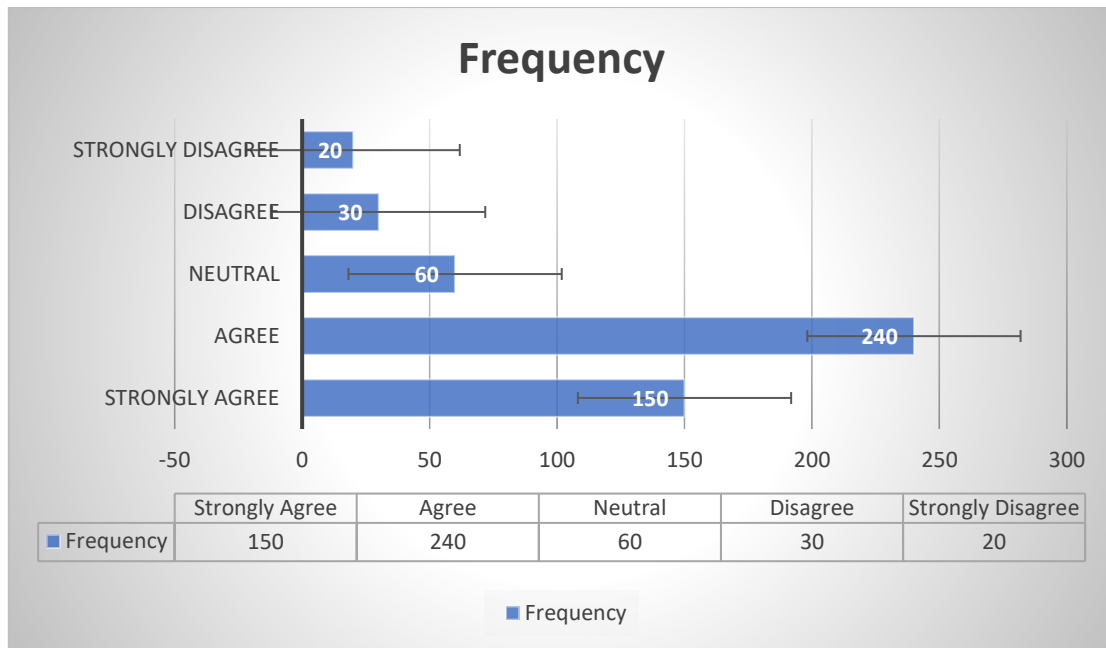


Figure 2. I believe that using electronic gamified applications helps to develop creativity.

Source: Author's calculations

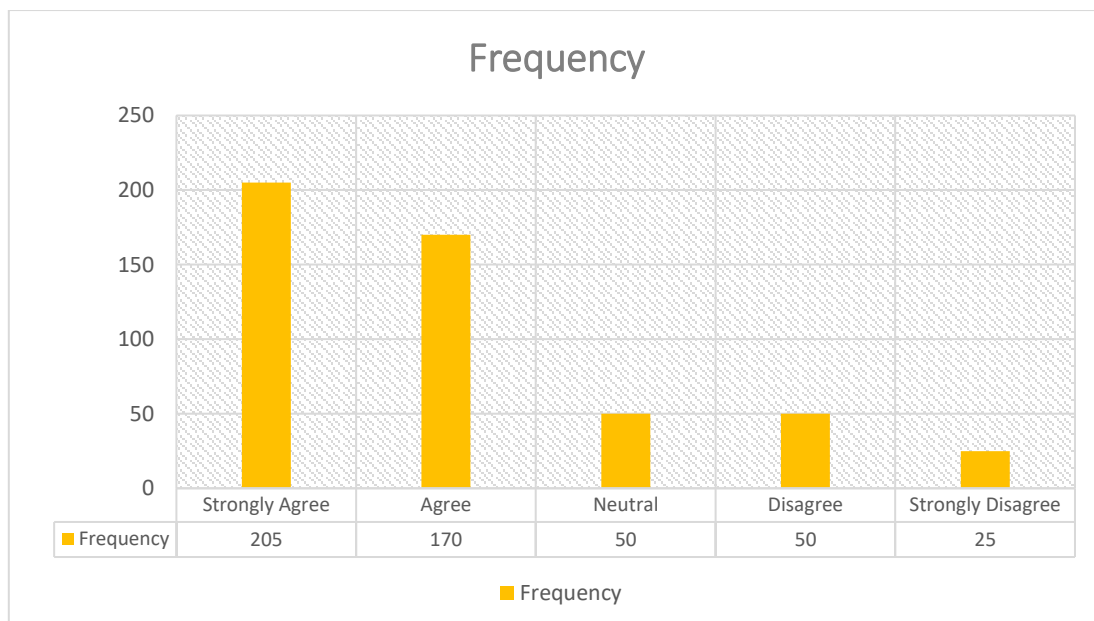


Figure 3. In my opinion, electronic gamified applications helped me in developing my communication skills.

Source: Author's compilation

Figure 3 presents the respondents' opinions regarding the impact of electronic gamified applications on the development of their communication skills. The data shows a varied range of responses, indicating mixed views among the respondents. A notable proportion of respondents agreed or strongly agreed with the statement, with 205 individuals (41%) strongly agreeing and 170 (34%) agreeing. This suggests that a significant number of respondents believe that electronic gamified applications have indeed helped them develop their communication skills. However, there is also a considerable number of respondents who expressed neutral, negative, or

strongly negative views. Fifty respondents (10%) were neutral, indicating a lack of strong opinion on the matter, while 50 (10%) disagreed and 25 (5%) strongly disagreed with the statement. This implies that a sizable portion of respondents either do not believe that electronic gamified applications have contributed to the development of their communication skills or have reservations about their effectiveness in this regard. Overall, while there is a positive perception among some respondents, there is also a notable degree of disagreement regarding the impact of electronic gamified applications on communication skills development.

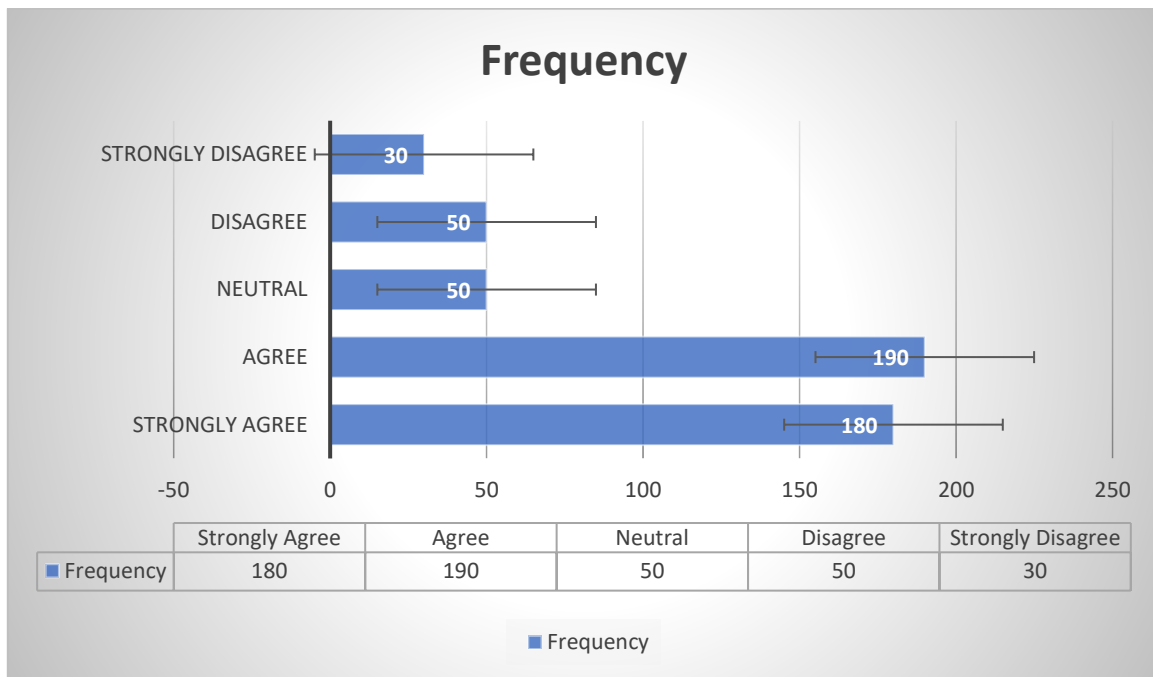


Figure 4. I believe my curiosity towards different things increased after using electronic gamified applications.

Source: Author's compilation

Figure 4 presents the respondents' perceptions regarding the impact of electronic gamified applications on their curiosity about different things. The data indicates a range of responses, suggesting a mixed view among the respondents. A substantial portion of respondents agreed or strongly agreed with the statement, with 180 individuals (36%) strongly agreeing and 190 (38%) agreeing. This suggests that a significant number of respondents believe that using electronic gamified applications has increased their curiosity about different things. However, there is also a notable proportion of respondents who expressed neutral, negative, or strongly negative views. Fifty respondents (10%) were neutral, indicating a lack of strong opinion on the matter, while 50 (10%) disagreed and 30 (6%) strongly disagreed with the statement. This implies that a sizable portion of respondents either do not believe that electronic gamified applications have increased their curiosity or have reservations about their impact in this regard. Overall, while there is a positive perception among some respondents, there is also a significant degree of skepticism or disagreement regarding the impact of electronic gamified applications on increasing curiosity.

Figure 5 illustrates the respondents' perceptions regarding the impact of electronic gamified applications on their overall efficiency. The data reveals a range of responses, indicating varying views among the respondents. A notable proportion of respondents either agreed or strongly agreed with the statement, with 210 individuals (42%) strongly agreeing and 190 (38%) agreeing. This suggests that a significant number of respondents believe that using electronic gamified applications has indeed boosted their overall efficiency. However, there is also a considerable number of respondents who expressed neutral, negative, or strongly negative views. Thirty respondents (6%) were neutral, indicating a lack of strong opinion on the matter, while 40 (8%) disagreed and 30 (6%) strongly disagreed with the statement. This implies that a sizable portion of respondents either do not believe that electronic gamified applications have enhanced their overall efficiency or have reservations about their effectiveness in this regard. Overall, while there is a positive perception among some respondents, there is also a notable degree of skepticism or disagreement regarding the impact of electronic gamified applications on boosting overall efficiency.

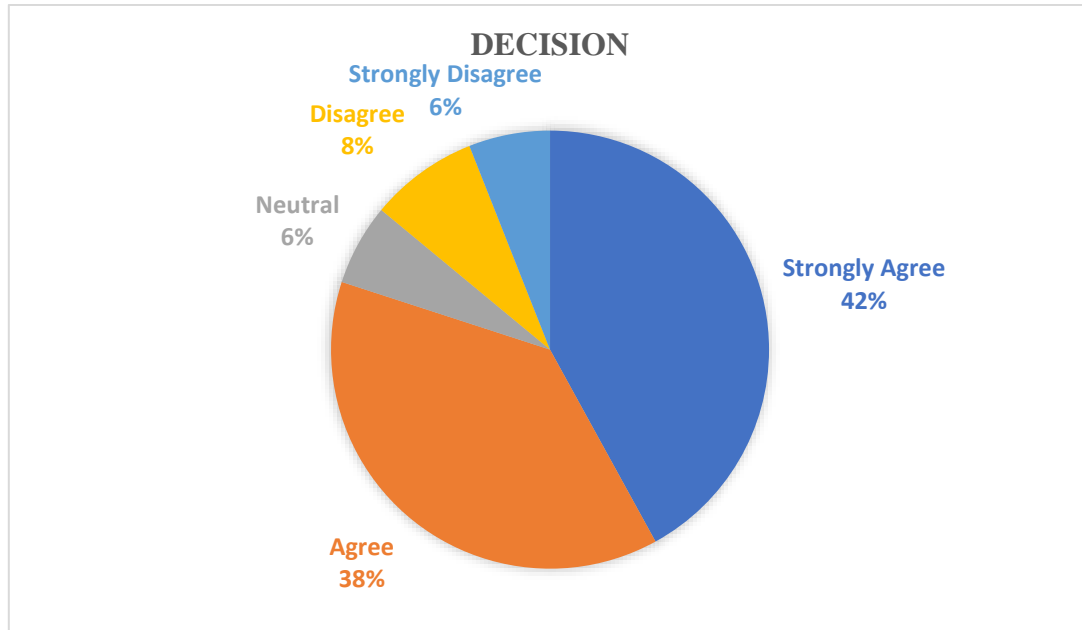


Figure 5. I believe that using electronic gamified applications boosted my overall efficiency.

Source: Researcher's calculations

V. CONCLUSION AND SUGGESTION

The study examined the impact of electronic gaming on the academic performance of junior high school students. Through a review of existing literature, it was found that gamification and electronic gaming have the potential to enhance various aspects of learning, including creativity, communication skills, curiosity, and overall efficiency. The empirical analysis of the respondents' perspectives revealed a generally positive perception of the effectiveness of electronic gamified

applications in developing calculation skills, fostering creativity, enhancing communication skills, increasing curiosity, and boosting overall efficiency. However, there were also instances of neutral or negative views, indicating some skepticism or disagreement among the respondents. Overall, the findings suggest that electronic gamified applications have the potential to positively influence the academic performance of junior high school students, but further research is needed to explore this relationship in more depth.

Impacts of e-gaming

Positive impacts		Limitations and further research areas	
Improved skills	The study suggests that e-gaming applications can potentially enhance specific skills like calculation, creativity, and curiosity. This could lead to improved academic performance in subjects related to these skills.	Mixed perceptions	The presence of neutral and negative views suggests that e-gaming's impact on academic performance might not be universal. Individual differences, game types, and application design could play a role.
Increased engagement	The positive perception of e-gaming suggests it might make learning more engaging and enjoyable for students, potentially leading to better academic outcomes.	Limited scope	The study focused on perceptions and did not directly measure academic performance. Further research with objective assessments is needed to confirm the perceived benefits.
Efficiency boost	The perceived increase in efficiency could indicate that e-gaming applications help students learn faster or manage their time more effectively, potentially improving academic performance.	Potential negative effects	The study primarily focused on positive aspects. Exploring potential negative effects like addiction, distraction, or negative impact on specific subjects is crucial for a balanced understanding.

Some key suggestions:

Not all e-gaming is equal	While the study suggests some benefits of electronic gamified applications, it is crucial to consider the type and design of the games. Not all e-gaming experiences are created equal, and some might have negative impacts on academic performance or other aspects of well-being.
Individual differences matter	The mixed opinions among respondents suggest that the effectiveness of e-gaming applications might vary depending on individual factors like learning styles, preferences, and existing skills.
Potential for targeted learning	The positive results in certain areas like calculation skills and creativity suggest that e-gaming applications could be developed specifically to address learning objectives and enhance specific skills within specific subjects.
Responsible integration	Integrating e-gaming into education should be done consciously and responsibly with clear guidelines established to address potential risks and ensure balanced learning experiences.
Need for further research	The study highlights the need for more in-depth research to explore the specific types of e-gaming applications, their impact on different academic subjects and skills, and potential negative effects.

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