iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** XII **Month of publication:** December 2025

DOI: https://doi.org/10.22214/ijraset.2025.76096

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue XII Dec 2025- Available at www.ijraset.com

Development of Gamified Stoichiometry Learning Strategy to Improve the Academic Adjustment of Geodetic Engineering Students

Princess J-Bie D. Panol[1], Kim Ann Ashley D. Pastolero[2], Jem Mikaela C. Pecho[3], Jesusa Angela Mignonette G. Predicala[4], Sheena Nicolle A. Reodique[5], John Renz D. Rivera[6], Rhiyan Chariz D. Salcedo[7], Bryle A. Armeza[8]
Bachelor of Sciences in Geodetic Engineering, Batangas State University, The National Engineering University, Batangas City, Philippines

Abstract: ***This study, entitled Development of a Gamified Stoichiometry Learning Strategy to Improve the Academic Adjustment of Geodetic Engineering Students, aimed to design, implement, and evaluate a Scratch-based gamified learning strategy to help first-year Geodetic Engineering students adjust more effectively to the academic demands of college chemistry. The research focused on determining how the strategy influences students' understanding of stoichiometric concepts, their retention of key formulas and procedures, their motivation to learn, and their overall academic adjustment. A quantitative research design was used, with participants randomly selected from first-year sections to ensure fairness and representativeness. Data were gathered through pre-tests, post-tests, and survey questionnaires, and were analyzed using descriptive statistics, Weighted Average Means, and a paired t-test to measure the significance of improvement following the intervention. All procedures followed strict ethical standards, ensuring voluntary participation, confidentiality, and secure handling of student information. Results showed that the gamified learning strategy produced substantial gains in conceptual understanding, strengthened long-term retention through repeated interactive tasks, and increased motivation through game-like features such as progress tracking and rewards. High WAM scores across both blocks and consistently positive responses supported these findings. The significant rise in post-test scores compared to pre-test results further confirmed the effectiveness of the intervention, demonstrating that the Scratch-based gamified Stoichiometry learning strategy successfully enhanced students' learning performance and overall academic adjustment.***

Keywords: Gamification, Stoichiometry, Academic Adjustment, Scratch, Geodetic Engineering Students, Learning Strategy.

I. INTRODUCTION

First year Geodetic Engineering students often struggle with chemistry especially when it comes to stoichiometry, since it requires mostly mathematic skills, ability in problem solving, and mostly the understanding of chemical reaction or more likely taking time to adjust to their new field, but most of them struggles in balancing chemical equations, converting units, and specifically when it comes to applying formulas, that often cause a low performance and peer pressure for some students to their respected program. Traditional teaching methods like lectures or activities, most students do not give any interest because of how difficult it is and mostly don't address it and not give interest to try to understand the concepts. This problem became more obvious when students encountered stoichiometry in college because it is a more advanced and analytical setting, unlike those previous years where only the introduction of stoichiometry was reached. There are many unfamiliar structures of college chemistry. As an outcome many students begin to develop negative thoughts about their program or academic burnout when it comes to chemistry, that affects their performance in the subject.

There are previous studies about gamification and it was an innovative approach when it comes to learning motivation and for education progress. Gamified based activities like point based tasks, interactive problem questionnaires, and reward systems can make a change to some compound lessons and make it more fun at the same time students can learn from it and can be easier to understand. But there are past studies that were applied in some various fields, there is still limited research when it comes to its impact especially on Geodetic Engineering students, who often rely more on intense computational skills for fieldwork and other educational practices.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue XII Dec 2025- Available at www.ijraset.com

This study aims to develop a Gamified Stoichiometry Learning Strategy and examine its effectiveness when it comes to the academic adjustment of First year Geodetic Engineering students. The game elements were emerging game elements by the learning process, this research seeks to know whether students are more enhanced, more improved, more confident, and were able to understand and apply stoichiometry concepts. The finding may help to contribute and to improve learning and teaching methods for both students and teachers when it comes to engineering programs, especially Geodetic Engineering students who face challenges in chemistry related subjects.

II. OBJECTIVES

This study aims to develop and evaluate a Scratch-based gamified Stoichiometry learning strategy in improving the academic adjustment of geodetic engineering students transitioning from senior high school to college.
It seeks to answer the following questions.

1) Analyze the improvement of the students' academic adjustment after using the gamified stoichiometry learning strategy in terms of:
    1.1. understanding of stoichiometry concepts;
    1.2. retention; and
    1.3. motivation;
2) Is there a significant difference in the students' pre-test and post-test scores after using the Scratch-based gamified Stoichiometry learning strategy?
3) Determine the effectiveness of the gamified stoichiometry learning strategy in supporting the academic adjustment of geodetic engineering students.

III. MATERIALS AND METHODS

A. *Research Design*

The researchers used quantitative research design to determine the effectiveness of the Scratch-based gamified Stoichiometry learning strategy in improving the academic adjustment of freshman Geodetic Engineering students. This design is appropriate because it allows the researcher to gather measurable data that will show changes in students' understanding, retention, and motivation before and after using the learning strategy. It was chosen because it best suited the objectives of the study.

B. *Subjects of the Study*

This study used first year BS Geodetic Engineering students from the Alangilan Campus of Batangas State University as respondents. They are reliable sources of data because they are still in the process of adapting from senior high to college environment. The distribution of respondents per campus is presented in table 1.

Table 1. Distribution of Respondents

1st Year BS Geodetic Engineering	Population of Students
1101	25
1102	25
Total	50

C. *Data Gathering Instrument*

The study used two main instruments to gather data: a researcher-made test and a structured questionnaire.

1) *Pre-Test and Post-Test.* The pre-test and post-test were multiple-choice assessments on key stoichiometry concepts. The pre-test measured students' prior knowledge, while the post-test evaluated their improvement after using the Scratch-based gamified learning strategy.
2) *Questionnaire.* A Google Forms questionnaire with three parts was used: Part I measured understanding, Part II measured retention, and Part III measured motivation. These provided data on how the gamified approach supported students' academic adjustment.

3) Scoring of Responses. All responses were rated using a four-point Likert scale (4 = Strongly Agree to 1 = Strongly Disagree) to assess students' understanding, retention, and motivation.

Option	Scale Range	Adjectival Rating
4	3.26 – 4.00	Strongly Agree
3	2.51 – 3.25	Agree
2	1.76 – 2.50	Disagree
1	1.00 – 1.75	Strongly Disagree

D. Data Gathering Procedure

The study was conducted at Batangas State University – Alangilan Campus with first-year Geodetic Engineering students as respondents. Participation was voluntary, confirmed through a consent checklist. A pre-test and baseline survey were first administered to assess students' initial understanding, motivation, retention, and academic adjustment in stoichiometry. Students then engaged in the Scratch-based gamified activities during regular chemistry sessions, facilitated by the researcher and instructor. After the intervention, a post-test and post-survey were conducted to measure improvements, and all responses were collected, encoded, and prepared for statistical analysis.

IV. RESULTS AND DISCUSSION

A. Analysis of Pre-Test and Post-Test Scores

Pre-test and Post-Test

Table 2. Overall Pre-Test Results on the Effectiveness of Gamified Stoichiometry Learning Strategy for Geodetic Engineering Students' Academic Adjustment

Student	Score	
	1101	1102
1	25	10
2	0	15
3	10	10
4	15	25
5	5	10
6	10	10
7	10	5
8	15	10
9	20	15
10	5	10
11	20	15

12	5	15
13	5	10
14	10	10
15	10	10
16	15	15
17	15	20
18	15	10
19	15	5
20	10	15
21	10	20
22	15	15
23	10	20
24	15	25
25	25	25

Table 2 shows that before the implementation of the Gamified Stoichiometry Learning Strategy, students from Sections 1101 and 1102 had a generally low to moderate understanding of stoichiometry, with most scoring between 10–15 points. Only a few reached higher scores (20–25), while some scored very low (0–5), indicating difficulty with basic concepts. These results highlight the need for a more engaging and supportive learning method. This aligns with Mandina & Ochonogor (2018), who identified stoichiometry as one of the most challenging topics for students, emphasizing the importance of an improved approach such as gamified learning.

Table 3. Overall Post-Test Results on the Effectiveness of Gamified Stoichiometry Learning Strategy for Geodetic Engineering Students' Academic Adjustment

Student	Score	
	1101	1102
1	25	30
2	30	30
3	25	30
4	25	20
5	20	30

6	30	30
7	30	20
8	25	25
9	30	25
10	25	25
11	30	25
12	25	25
13	20	25
14	25	30
15	20	30
16	35	20
17	25	25
18	25	20
19	30	30
20	30	20
21	30	25
22	30	25
23	25	25
24	30	30
25	25	30

Table 3 shows that after using the Gamified Stoichiometry Learning Strategy, students from Sections 1101 and 1102 achieved moderate to high mastery of the topic, with most scoring between 20–30 points. Eight students scored 30, and seven scored 25, indicating strong understanding after the intervention. These results support the findings of Lutfi et al. (2023), who noted improved retention and achievement through game-based materials, and Aisyah et al. (2022), who reported that gamified learning boosts engagement and helps engineering students adjust to academic demands.

Table 4. Comparison Table of Pre-Test and Post-Test Results on the Effectiveness of Gamified Stoichiometry Learning Strategy for Geodetic Engineering Students' Academic Adjustment

Student	Scores			
	1101		1102	
	Pre-Test	Post-Test	Pre-Test	Post-Test
1	25	25	10	30
2	0	30	15	30
3	10	25	10	30
4	15	25	25	20
5	5	20	10	30
6	10	30	10	30
7	10	30	5	20
8	15	25	10	25
9	20	30	15	25
10	5	25	10	25
11	20	30	15	25
12	5	25	15	25
13	5	20	10	25
14	10	25	10	30
15	10	20	10	30
16	15	35	15	20
17	15	25	20	25
18	15	25	10	20
19	15	30	5	30
20	10	30	15	20
21	10	30	20	25
22	15	30	15	25
23	10	25	20	25
24	15	30	25	30
25	25	25	25	30

Table 4 shows a clear increase from pre-test to post-test scores, with most students moving from low scores (5–20) to higher scores (20–30) after using the Gamified Stoichiometry Learning Strategy. This supports Aquino & Bautista (2022), who also found improved chemistry scores after an engaging learning method. Overall, the results show that the gamified strategy effectively improved students' understanding, performance, and academic adjustment.

B. Improvement of the Gamified Stoichiometry Learning Strategy on Geodetic Engineering Students' Academic Adjustment

Table 5. Overall Level of Development of Gamified Stoichiometry Learning Strategy in Understanding

Indicators	WM	VD
1. I understand mole, mass, and particle relationships better after using the gamified tool.	3.72	Strongly Agree
2. I find it easier to identify the given and required quantities in stoichiometry problems.	3.65	Strongly Agree
3. I understand stoichiometry concepts better after using the gamified learning strategy.	3.62	Strongly Agree
4. I can solve stoichiometry problems more effectively through the step-by-step gamified activities.	3.61	Strongly Agree
5. I can explain stoichiometry concepts more clearly after using the gamified strategy.	3.60	Strongly Agree
Average WAM	3.64	Strongly Agree

Table 6. Overall Level of Development of Gamified Stoichiometry Learning Strategy in Retention

Indicators	WM	VD
1. I remember stoichiometry concepts better after using the gamified learning strategy.	3.52	Strongly Agree
2. I can recall formulas and problem-solving steps more easily after the gamified activities.	3.52	Strongly Agree
3. I can still remember how to solve stoichiometry problems even after some time has passed.	3.38	Strongly Agree
4. I can review and reinforce previous lessons effectively through the gamified activities.	3.38	Strongly Agree
5. I retain stoichiometry procedures longer because of the gamified learning tasks.	3.44	Strongly Agree
Average WAM	3.45	Strongly Agree

Table 7. Overall Level of Development of Gamified Stoichiometry Learning Strategy in Motivation

Indicators	WM	VD
1. I feel more interested in learning stoichiometry because of the gamified strategy.	3.68	Strongly Agree
2. I find the learning experience more engaging because of the game-like format.	3.68	Strongly Agree
3. I feel motivated to improve my performance when I can see my progress in the activities.	3.60	Strongly Agree
4. I am encouraged to complete tasks because of the reward or level-up features.	3.60	Strongly Agree
5. I feel more confident studying stoichiometry because of the gamified strategy.	3.56	Strongly Agree
Average WAM	3.62	Strongly Agree

The Scratch-based gamified stoichiometry learning strategy effectively improved first-year Geodetic Engineering students' understanding, retention, and motivation. High WAM scores (3.60–3.72) showed better comprehension of mole–mass–particle relationships, easier identification of given and required quantities, and stronger problem-solving skills. Retention also increased, with WAM scores of 3.38–3.52 reflecting improved recall of formulas, procedures, and problem-solving steps over time. Motivation was strengthened through interactive features such as progress tracking and rewards, earning WAM values of 3.56–3.68. Overall, the findings confirm that the Scratch-based gamified strategy is effective in enhancing cognitive understanding, long-term memory, and student engagement, thereby supporting academic adjustment in learning complex stoichiometry concepts.

C. Sectional Comparison of Survey Responses on Gamified Stoichiometry Learning Strategy

Table 8. Block 1101 Respondents' Level of Understanding of the Gamified Stoichiometry Learning Strategy

Indicators	WM	VD
1. I understand mole, mass, and particle relationships better after using the gamified tool.	3.56	Strongly Agree
2. I find it easier to identify the given and required quantities in stoichiometry problems.	3.48	Strongly Agree
3. I understand stoichiometry concepts better after using the gamified learning strategy.	3.52	Strongly Agree
4. I can solve stoichiometry problems more effectively through the step-by-step gamified activities.	3.56	Strongly Agree
5. I can explain stoichiometry concepts more clearly after using the gamified strategy.	3.52	Strongly Agree
Average WAM	3.53	Strongly Agree

Table 8 shows that students in Block 1101 strongly agree that the gamified stoichiometry strategy helped them understand key concepts, with WAM values from 3.48 to 3.56. They reported better comprehension of mole, mass, and particle relationships, easier identification of given and required quantities, clearer understanding of stoichiometry concepts, and improved ability to solve and explain problems. This supports recent studies showing that gamified learning enhances conceptual understanding and engagement in science education (Camacho-Sánchez, Rillo-Albert, 2023).

Table 9. Block 1101 Respondents' Level of Retention of the Gamified Stoichiometry Learning Strategy

Indicators	WM	VD
1. I remember stoichiometry concepts better after using the gamified learning strategy.	3.48	Strongly Agree
2. I can recall formulas and problem-solving steps more easily after the gamified activities.	3.48	Strongly Agree
3. I can still remember how to solve stoichiometry problems even after some time has passed.	3.36	Strongly Agree
4. I can review and reinforce previous lessons effectively through the gamified activities.	3.36	Strongly Agree
5. I retain stoichiometry procedures longer because of the gamified learning tasks.	3.44	Strongly Agree
Average WAM	3.42	Strongly Agree

Table 9 shows that students in Block 1101 strongly agree that the gamified stoichiometry strategy improved their retention of concepts and procedures, with WAM scores ranging from 3.36 to 3.48. They reported better recall of formulas, problem-solving steps, and key ideas over time. These results align with studies showing that gamified learning enhances achievement and long-term retention in science education (Sanchez, 2024). Overall, the findings indicate that the Scratch-based gamified tool effectively supports sustained understanding of stoichiometry among geodetic engineering students.

Table 10. Block 1101 Respondents' Level of Motivation of the Gamified Stoichiometry Learning Strategy

Indicators	WM	VD
1. I feel more interested in learning stoichiometry because of the gamified strategy.	3.68	Strongly Agree
2. I find the learning experience more engaging because of the game-like format.	3.72	Strongly Agree
3. I feel motivated to improve my performance when I can see my progress in the activities.	3.64	Strongly Agree
4. I am encouraged to complete tasks because of the reward or level-up features.	3.72	Strongly Agree
5. I feel more confident studying stoichiometry because of the gamified strategy.	3.64	Strongly Agree
Average WAM	3.68	Strongly Agree

Table 10 shows that students in Block 1101 strongly agree that the gamified stoichiometry learning strategy helped them retain key concepts and procedures, with WAM values ranging from 3.64 to 3.72. They reported better memory of stoichiometry concepts, easier recall of formulas and problem-solving steps, effective review of lessons, and longer retention of procedures. These findings are consistent with recent studies showing that gamified learning improves long-term retention and engagement in science and STEM education (Lavega-Burgués, 2022). This suggests that the Scratch-based gamified stoichiometry strategy effectively supports students' sustained learning of complex chemistry concepts.

Table 11. Block 1102 Respondents' Level of Understanding of the Gamified Stoichiometry Learning Strategy

Indicators	WM	VD
1. I understand mole, mass, and particle relationships better after using the gamified tool.	3.88	Strongly Agree
2. I find it easier to identify the given and required quantities in stoichiometry problems.	3.84	Strongly Agree
3. I understand stoichiometry concepts better after using the gamified learning strategy.	3.76	Strongly Agree
4. I can solve stoichiometry problems more effectively through the step-by-step gamified activities.	3.68	Strongly Agree
5. I can explain stoichiometry concepts more clearly after using the gamified strategy.	3.68	Strongly Agree
Average WAM	3.77	Strongly Agree

Table 11 shows that students in Block 1102 strongly agree that the gamified stoichiometry strategy helped them understand key concepts, with WAM values ranging from 3.68 to 3.88. They reported improved comprehension of mole, mass, and particle relationships, easier identification of given and required quantities, clearer understanding of stoichiometry concepts, and enhanced problem-solving and explanation skills. This supports research indicating that gamified learning effectively increases conceptual understanding and engagement in science education (Camacho-Sánchez, 2022).

Table 12. Block 1102 Respondents' Level of Retention of the Gamified Stoichiometry Learning Strategy

Indicators	WM	VD
1. I remember stoichiometry concepts better after using the gamified learning strategy.	3.56	Strongly Agree
2. I can recall formulas and problem-solving steps more easily after the gamified activities.	3.56	Strongly Agree
3. I can still remember how to solve stoichiometry problems even after some time has passed.	3.44	Strongly Agree
4. I can review and reinforce previous lessons effectively through the gamified activities.	3.40	Strongly Agree
5. I retain stoichiometry procedures longer because of the gamified learning tasks.	3.44	Strongly Agree
Average WAM	3.48	Strongly Agree

Table 12 shows that students in Block 1102 strongly agree that the gamified stoichiometry strategy helped them retain key concepts and procedures, with WAM values ranging from 3.40 to 3.56. Students reported improved memory of stoichiometry concepts, easier recall of formulas and problem-solving steps, and effective review of previous lessons. These results support research showing that gamified learning enhances long-term retention, understanding, and engagement in science education (Rillo-Albert, 2022). This suggests that the Scratch-based gamified strategy effectively reinforces students' retention of stoichiometry knowledge over time.

Table 13. Block 1102 Respondents' Level of Motivation of the Gamified Stoichiometry Learning Strategy

Indicators	WM	VD
1. I feel more interested in learning stoichiometry because of the gamified strategy.	3.68	Strongly Agree
2. I find the learning experience more engaging because of the game-like format.	3.64	Strongly Agree
3. I feel motivated to improve my performance when I can see my progress in the activities.	3.56	Strongly Agree
4. I am encouraged to complete tasks because of the reward or level-up features.	3.48	Strongly Agree
5. I feel more confident studying stoichiometry because of the gamified strategy.	3.60	Strongly Agree
Average WAM	3.59	Strongly Agree

Table 13 shows that Block 1102 students strongly agree that the gamified stoichiometry strategy increased their engagement and motivation, with WAM scores ranging from 3.48 to 3.68. Students reported higher interest, stronger motivation, and greater confidence due to features such as progress tracking, rewards, and level-up mechanics. These findings align with studies showing that gamified learning environments can enhance student motivation and engagement by making academic tasks more interactive and rewarding (Sardja et al., 2021).

V. CONCLUSIONS

Based on the data gathered and analyzed in this study, the following conclusions were formulated:

1) Academic Adjustment Improvement Through Gamified Stoichiometry Learning

a) The Scratch-based gamified Stoichiometry strategy effectively improved students' comprehension of stoichiometry concepts, including relationships between moles, mass, and particles, problem-solving, and identification of quantities. Both blocks benefited, with Block 1102 showing slightly higher gains.

b) The strategy significantly enhanced students' retention of formulas, procedural steps, and key concepts. Repetitive and interactive tasks reduced confusion and promoted long-term understanding, with consistent improvements across both blocks

c) Gamified features such as rewards, progress tracking, and interactivity increased students' engagement, confidence, and interest in learning stoichiometry. Both blocks experienced motivational improvements, with Block 1101 slightly higher in some indicators.

2) The post-test scores were significantly higher than pre-test scores, confirming that the strategy effectively enhanced academic performance, understanding, retention, and motivation, thereby supporting the academic adjustment of Geodetic Engineering students. These results support the alternative hypothesis.

VI. RECOMMENDATIONS

Based on the findings, the following recommendations are proposed to improve the teaching and learning of stoichiometry for first-year geodetic engineering students, chemistry professors, and future researchers.

1) For Students: Using Scratch-based gamified activities can make learning stoichiometry more interactive and engaging, helping students visualize concepts, improve problem-solving skills, enhance retention, and build confidence.

2) For Chemistry Professors: Integrating gamified strategies with animations, interactive visuals, and feedback can make teaching stoichiometry more effective, motivate active participation, and support students' academic performance.

3) For Future Researchers: Further studies can explore gamified strategies in other science or engineering courses, investigate long-term learning outcomes, and examine differences among students with diverse backgrounds to enhance interactive learning in higher education.

VII. ACKNOWLEDGEMENT

The researchers would like to express their sincere gratitude and appreciation for the following individuals who guided the completion of this study:

Dr. Cristina Amor Rosales, Dean of the College of Engineering for the acceptance and approval of this research and words of encouragement for the researchers;

Sir Bryle Arellano Armeza for his contribution in the interpretation of the results the research adviser for his great concern, patience, and motivation that kept the researchers constantly motivated and inspired;

The researchers also acknowledge the cooperation of the first-year Geodetic Engineering students from Block 1101 and 1102, whose participation in the pre-tests, post-tests, and survey questionnaires allowed for the accurate evaluation of the gamified stoichiometry learning strategy. Their involvement served as a vital component of the study;

The researchers further recognize the contribution of the Scratch development community, whose platform enabled the creation and integration of interactive, gamified instructional materials essential to the study's instructional framework;

Their parents, for their unconditional love, encouragement, understanding, and financial and moral support throughout the process of conducting this study;

Above all else, the Almighty God who gifted them with life, strength, and wisdom and helped them get through all the challenges they encountered along the way.

REFERENCES

[1] Aisyah, N., et al. (2022). Gamification approach towards engineering students' learning. International Journal of Information and Education Technology, 12(6), 485–490. https://pdfs.semanticscholar.org/9624/a8580cd4c7a07c736aecf581b5312d436b09.pdf

[2] Aquino, J. E., & Bautista, R. G. (2022). CHEMIKA and students' academic achievement in chemistry. American Journal of Educational Research, 10(8), 501–507. https://doi.org/10.12691/education-10-8-4

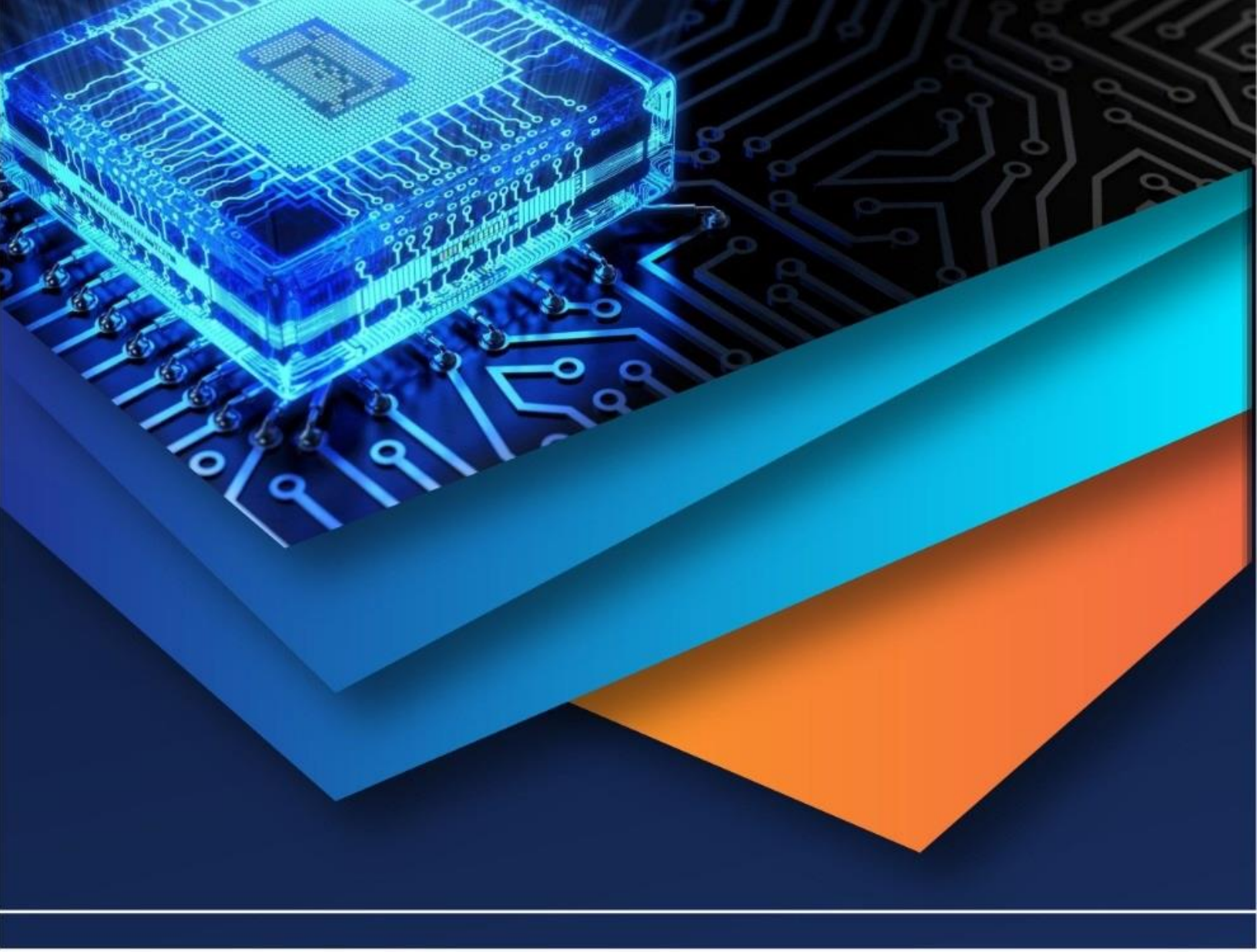
[3] Camacho-Morles, J., Wentzel, K., Altermatt, E., & Worley, C. (2025). The relationship between perceived peer support and academic adjustment: The chain mediating roles of academic hope and professional identity. Frontiers in Psychology, 16, Article 1534883. https://doi.org/10.3389/fpsyg.2025.1534883

[4] Lutfi, A., Aftinia, F., & Permani, B. E. (2023). Gamification: Game as a medium for learning chemistry to motivate and increase retention of students' learning outcomes. Journal of Technology and Science Education, 13(1), 193-207. https://doi.org/10.3926/jotse.1842

[5] Mandina, S., & Ochonogor, C. (2018). Comparative Effect of two problem-solving instructional strategies on students' achievement in stoichiometry. Eurasia Journal of Mathematics Science and Technology Education, 14(12).

[6] https://doi.org/10.29333/ejmste/95125Sardija, A., et al.(2021) Analysing the impact of gamification techniques on enhancing learner engagement, motivation, and knowledge retention: A structural equation modelling approach. Electronic Journal of e-Learning, 22(9), 111-124. https://doi.org/10.34190/ejel.22.9.3563

[7] Sánchez, D., & Ortega, C. (2024). Immersive gamified learning environments in STEM: Effects on student engagement and achievement. Education Sciences, 14(2), 155. https://doi.org/10.3390/educsci14020155



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY