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The Effectiveness of Innovative Approaches to Curriculum Design for Science Subjects in Senior High School (Academic Track)

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A R T I C L E I N F O

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A B S T R A C T

This study examined the effectiveness of innovative curriculum approaches in teaching science subjects among Senior High School students at Uddiawan National Agro-Industrial School. Using a descriptive-correlational design, data were gathered from 75 students through a validated survey questionnaire measuring engagement, attitudes, curriculum relevance, and learning outcomes. Findings revealed that innovative approaches significantly enhanced student engagement, motivation, and academic performance, with high levels of agreement across all indicators. Students developed more positive attitudes toward science and recognized its real-life applications. Furthermore, significant relationships were found between students' profiles (sex, age, strand, and subject) and their perceptions. Overall, the study concludes that innovative, student-centered curriculum designs improve learning experiences and outcomes in science education.

INTRODUCTION

Science education plays a vital role in shaping students' critical thinking, creativity, and problem-solving skills, which are essential for thriving in the 21st century. However, traditional methods of teaching science often focus heavily on memorization and theoretical instruction, resulting in limited engagement and conceptual understanding among learners. To address this, educators and curriculum developers have begun integrating innovative approaches to curriculum design that promote inquiry, experimentation, and real-world application. These approaches aim to make learning more student-centered, interactive, and relevant to daily life and future careers (Liao et al., 2023).

Globally, the emphasis on innovative curriculum design in science has led to improvements in student achievement and motivation. Fang (2020) noted that interest-driven and inquiry-based curricula in China have significantly enhanced students' participation and enthusiasm in science classes. Similarly, Wei (2019) highlighted that reforms in the high school chemistry curriculum focusing on intellectual engagement and problem-solving have resulted in deeper learning and sustained curiosity among students. These findings suggest that the design and implementation of innovative curricula are key factors in cultivating scientific literacy and higher-order thinking. However, studies indicate that many schools still face challenges in effectively implementing innovative approaches due to resource limitations, teacher readiness, and traditional classroom practices (Dayao & Aquino, 2022). According to Almazan et al. (2020), consistent curriculum evaluation and innovation are essential to ensure relevance and effectiveness in meeting students' diverse learning needs.

In the Philippine context, the implementation of the K–12 curriculum has created opportunities for innovation in Senior High School education. Science subjects within the Academic Track—such as Biology, Chemistry, Physics, and Earth Science—serve as foundations for future STEM-related careers. Yet, despite the curriculum reforms, many schools continue to face challenges in effectively applying innovative approaches that align with students' interests and learning needs.

This study seeks to determine the effectiveness of innovative approaches to curriculum design for science subjects among Senior High School students of Uddiawan National Agro-Industrial School, focusing on their impact on student engagement, attitude, curriculum relevance, and perceived learning outcomes.

LITERATURE REVIEW

Foreign studies consistently emphasize that innovative curriculum approaches significantly enhance students' motivation, engagement, and higher-order thinking skills. Fang (2020) demonstrated that interest-driven curriculum design improves student performance in science, while Liao et al. (2023) and Wei (2019) highlighted the effectiveness of competence-oriented and inquiry-based instruction in developing critical thinking and problem-solving skills. Similarly, Wang (2024) and Sinta et al. (2025) found that hands-on experiments, collaboration, and digital tools strengthen scientific reasoning and engagement among learners.

Moreover, advancements in technology and interdisciplinary learning further support curriculum innovation. Tavakoli et al. (2021) showed that artificial intelligence enhances personalized learning, while Buckley et al. (2021) emphasized the value of interdisciplinary curriculum integration in deepening conceptual understanding. Studies by Bice and Cortes (2025), Cramer et al. (2014), and Wang (2024) also confirmed that inquiry-based laboratory instruction and real-world applications improve participation, comprehension, and interest in science. Overall, these studies highlight the global shift toward innovative, learner-centered curriculum design.

Local studies support the effectiveness of innovative curriculum approaches within the Philippine educational context. Almazan et al. (2020) found that well-implemented STEM curricula positively influence student performance, while Lazara and Morales (2018) identified challenges faced by teachers in applying innovative strategies due to limited resources and training. Dayao and Aquino (2022) and Argate et al. (2024) further noted that although the Senior High School curriculum promotes critical thinking, traditional teaching practices remain prevalent.

Additionally, studies highlight the benefits of contextualized and technology-based instruction. Pinuela (2024) and Pinar (2023) reported improved student creativity and comprehension through localized courseware, while Padilla et al. (2023) emphasized the role of contextualized learning in increasing awareness of global issues. Gabor and Camano (2022) and Paco and Linaugo (2023) demonstrated that hybrid learning models and Strategic Intervention Materials enhance student performance, adaptability, and retention of science concepts. These findings confirm that innovative curriculum design improves engagement and academic achievement in Philippine Senior High Schools.

METHODOLOGY

The study employed a descriptive-correlational research design to examine the effectiveness of innovative curriculum approaches in teaching science subjects among Senior High School students at Uddiawan National Agro-Industrial School. Data were collected through a structured survey questionnaire administered to 75 purposively selected students enrolled in science-related subjects under the Academic Track during the Academic Year 2025–2026. The instrument consisted of two parts: respondent profiles and 5-point Likert scale measuring key indicators such as student engagement, science attitude, curriculum relevance and innovation, and learning outcomes. The questionnaire underwent expert validation and pilot testing, yielding a high reliability coefficient, ensuring the accuracy and consistency of the data.

Data gathering followed ethical procedures, including securing permission, obtaining consent, and ensuring confidentiality. The collected data were processed through checking, tallying, and interpretation to enhance accuracy. Statistical tools such as frequency and percentage distribution were used to describe respondent profiles, while the Likert scale quantified perceptions of curriculum effectiveness. Additionally, the chi-square test was utilized to determine the relationship between innovative curriculum

approaches and respondents' profiles, allowing the researcher to identify significant associations and better understand the impact of curriculum innovation on students' learning experiences.

RESULTS

Part I. Profile of the Respondents

This part of the research presents the general profile of the respondents.

Table 1. Distribution of Respondents as to Sex

Particulars	Frequency	Percentage
Male	27	36.00
Female	48	64.00
Total	**75**	**100.00**

Table 1 shows the gender of the respondents. It can be viewed that females have a frequency of 48 or 64 percent, while the male counterpart has 27 counts or 36 percent. Out of the 75 respondents, it is implied that female dominates the male respondents.

Table 2. Distribution of Respondents as to Age

Particulars	Frequency	Percentage
16 years old	32	43.00
17 years old	18	24.00
18 years old	20	27.00
19 years old and above	5	7.00
Total	**75**	**100.00**

It can be gleaned from Table 2 that the majority of the respondents are between 16 years old, comprising 32 students or 43 percent of the sample. This is followed by respondents aged 18 years, with 20 students or 27 percent, those aged 17 years with 18 teachers or 24 percent, and respondents aged 19 years and above, with 5 students or 7 percent. Overall, the data indicate that most senior high school student respondents at Uddiawan Agro-industrial School fall within the 16-year age range.

Table 3. Distribution of Respondents as to Strand

Particulars	Frequency	Percentage
STEM	12	16.00
ABM	10	13.00
HUMSS	53	71.00
Total	**12**	**100.00**

Table 3 shows that most respondents were from the HUMSS strand, comprising 53 students or 71% of the total population. In comparison, only 12 respondents (16%) were from STEM and 10 respondents (13%) were from ABM, indicating a smaller representation from these strands. Overall, the data reveal

that the sample is heavily dominated by HUMSS students, which may influence the study's findings, particularly in relation to perceptions and experiences in science subjects and innovative curriculum approaches.

Table 4. Distribution of Respondents as to Science Subjects

Particulars	Frequency	Percentage
EARTH SCIENCE	2	3.00
EARTH AND LIFE SCIENCE	30	40.00
PHYSICAL SCIENCE	17	23.00
BIOLOGY	11	15.00
CHEMISTRY	5	7.00
PHYSICS	10	13.00
Total	**75**	**100.00**

Table 4 shows that most respondents were enrolled in Earth and Life Science (30 or 40%), followed by Physical Science (17 or 23%). Fewer participants were in Biology (11 or 15%), Physics (10 or 13%), and Chemistry (5 or 7%), while Earth Science had the least with only 2 respondents (3%). Overall, the data indicate that respondents were mainly concentrated in Earth and Life Science and Physical Science, which may influence the study's findings toward experiences in these subjects.

II. Problem Proper

The next table will present the effectiveness of innovative approaches to curriculum design for science subjects.

Table 5. Computed Mean on Student Engagement

Particulars	Weighted Mean	Qualitative Description
1. I actively participate in the science activities designed under the new curriculum.	4.16	Agree
2. The innovative science lessons motivate me to learn more about the topic.	4.28	Strongly Agree
3. I find the science experiments and projects exciting and enjoyable.	3.25	Neutral
4. The innovative approach encourages me to ask more questions and share my ideas.	4.26	Strongly Agree
5. I look forward to attending my science class because of the new curriculum activities.	4.91	Strongly Agree
Average Weighted Mean	**4.17**	**Agree**

Table 5 indicates that students generally experienced a high level of engagement in science classes under innovative curriculum approaches, with an overall mean of 4.17 ("Agree"). The highest-rated item was students looking forward to attending science classes (4.91, "Strongly Agree"), showing increased interest and enthusiasm. Other indicators, such as motivation to learn (4.28) and

encouragement to participate (4.26), were also rated "Strongly Agree," reflecting positive effects on engagement and participation.

However, the enjoyment of experiments and projects received the lowest rating (3.25, "Neutral"), suggesting that not all activities were equally engaging. Overall, the results show that innovative approaches effectively enhance motivation, participation, and interest, though some aspects still need improvement.

Table 6. Computed Mean on Attitudes Toward Science

Particulars	Weighted Mean	Qualitative Description
1. The innovative curriculum has made me more interested in learning science.	4.68	Strongly Agree
2. I now believe that science is useful in understanding real-life problems.	4.12	Agree
3. I feel more confident in performing science tasks and experiments.	4.56	Strongly Agree
4. I enjoy learning science topics more compared to before.	3.16	Neutral
5. The new curriculum makes me appreciate science as a subject that helps society.	4.85	Strongly Agree
Average Weighted Mean	**4.27**	**Strongly Agree**

Table 6 shows that students developed a highly positive attitude toward science under innovative curriculum approaches, with an overall mean of 4.27 ("Strongly Agree"). The highest rating was on appreciating science's role in society (4.85), followed by increased interest (4.68) and confidence in performing tasks (4.56), indicating strong positive impacts on perception and engagement.

Students also generally agreed that science helps in understanding real-life problems (4.12). However, enjoyment of learning science received the lowest rating (3.16, "Neutral"), suggesting that not all students experienced increased enjoyment. Overall, the curriculum positively influenced attitudes, especially in interest, confidence, and appreciation, though enjoyment varied.

Table 7. Computed Mean on Curriculum Relevance and Innovation

Particulars	Weighted Mean	Qualitative Description
1. The lessons are connected to real-life situations and practical applications.	3.64	Agree
2. Technology integration in the curriculum helps me understand complex concepts.	4.61	Strongly Agree
3. The projects and performance tasks are meaningful and relevant to daily life.	4.53	Strongly Agree
4. The new curriculum provides opportunities for teamwork and collaboration.	4.75	Strongly Agree

5. The science curriculum allows me to use creativity and critical thinking in solving problems.	4.39	Strongly Agree
Average Weighted Mean	**4.38**	**Strongly Agree**

Table 7 indicates that students strongly perceived the innovative science curriculum as relevant and effective, with an overall mean of 4.38 ("Strongly Agree"). The highest-rated aspect was opportunities for teamwork and collaboration (4.75), followed by technology integration (4.61) and meaningful, real-life tasks (4.53), showing that these elements enhanced understanding and learning relevance.

The curriculum also effectively promoted creativity and critical thinking (4.39). However, the connection of lessons to real-life situations received the lowest rating (3.64, "Agree"), suggesting room for improvement. Overall, the findings show that the curriculum successfully fosters relevance, innovation, collaboration, and higher-order thinking.

Table 8. Computed Mean on Learning Outcomes and Perceived Achievement

Particulars	**Weighted Mean**	**Qualitative Description**
1. I perform better in science because of the innovative curriculum design.	4.28	Strongly Agree
2. My understanding of science concepts has improved after experiencing the new lessons.	4.49	Strongly Agree
3. The assessments used (projects, experiments, digital tasks) measure my true learning.	4.33	Strongly Agree
4. The innovative curriculum helps me apply what I learned in real-life situations.	4.84	Strongly Agree
5. I believe the innovative curriculum in science is effective in improving my academic performance.	4.19	Agree
Average Weighted Mean	**4.43**	**Strongly Agree**

Table 8 shows that students strongly perceived improvements in their learning outcomes and academic performance due to innovative curriculum approaches, with an overall mean of 4.43 ("Strongly Agree"). The highest-rated item was the ability to apply learning in real-life situations (4.84), followed by improved understanding of science concepts (4.49) and effective assessment methods (4.33), indicating enhanced comprehension and authentic evaluation.

Students also agreed that their performance improved (4.28), while overall effectiveness in improving academic performance received the lowest but still positive rating (4.19, "Agree"). Overall, the findings confirm that innovative approaches effectively enhance understanding, application, and academic achievement in science.

Table 9. Significant Relationship between Student Engagement and their Sex

Particulars	Chi-Square	Significance
1. I actively participate in the science activities designed under the new curriculum.	6.12*	0.013
2. The innovative science lessons motivate me to learn more about the topic.	7.54*	0.006
3. I find the science experiments and projects exciting and enjoyable.	6.89*	0.009
4. The innovative approach encourages me to ask more questions and share my ideas.	5.95*	0.015
5. I look forward to attending my science class because of the new curriculum activities.	8.12*	0.004

**-significant*

The table indicates a significant positive relationship between sex and student engagement, showing that gender differences influence engagement levels. Female students generally demonstrated higher motivation, participation, and interest in science activities under the innovative curriculum compared to male students.

These findings support King (2016), who found that boys tend to exhibit lower motivation and engagement due to negative peer attitudes toward school. Overall, the results suggest that sex is an important factor affecting student engagement, as differences in behavior and participation exist between male and female students.

Table 10. Significant Relationship between Attitudes toward Science and their Sex

Particulars	Chi-Square	Significance
1. The innovative curriculum has made me more interested in learning science.	8.452*	0.037
2. I now believe that science is useful in understanding real-life problems.	7.936*	0.047
3. I feel more confident in performing science tasks and experiments.	9.218*	0.027
4. I enjoy learning science topics more compared to before.	8.004*	0.045
5. The new curriculum makes me appreciate science as a subject that helps society.	10.316*	0.016

**-significant*

The table shows that all Chi-square values were significant at the 0.05 level, indicating a significant relationship between students' attitudes toward science and their sex. This means that male and female students differ in terms

of interest, confidence, enjoyment, and appreciation of science under the innovative curriculum.

These findings support Akbudak (2009), which found that female students generally show higher interest in science than males. Overall, the results highlight that sex influences students' attitudes toward science, emphasizing the need for gender-responsive teaching strategies to ensure positive engagement for all learners.

Table 11. Significant Relationship between Curriculum Relevance and Innovation and their Sex

Particulars	Chi-Square	Significance
1. The lessons are connected to real-life situations and practical applications.	7.865*	0.049
2. Technology integration in the curriculum helps me understand complex concepts.	9.214*	0.027
3. The projects and performance tasks are meaningful and relevant to daily life.	8.976*	0.030
4. The new curriculum provides opportunities for teamwork and collaboration.	10.452*	0.015
5. The science curriculum allows me to use creativity and critical thinking in solving problems.	9.783*	0.020

**-significant*

The table shows that all Chi-square values were significant at the 0.05 level, indicating a significant relationship between curriculum relevance and innovation and students' sex. This suggests that male and female students differ in how they perceive the curriculum in terms of relevance, creativity, collaboration, and innovation.

These findings are supported by Aguillon et al. (2020), who found gender differences in engagement and self-efficacy in science. Overall, the results highlight that sex influences students' perceptions of innovative curriculum approaches, emphasizing the need for inclusive teaching strategies to ensure equal participation and positive learning experiences.

Table 12. Significant Relationship between Learning Outcomes and Perceived Achievement and their Sex

Particulars	Chi-Square	Significance
1. I perform better in science because of the innovative curriculum design.	8.972*	0.029
2. My understanding of science concepts has improved after experiencing the new lessons.	9.314*	0.024
3. The assessments used (projects, experiments, digital tasks) measure my true learning.	8.658*	0.033

4. The innovative curriculum helps me apply what I learned in real-life situations.	10.247*	0.017
5. I believe the innovative curriculum in science is effective in improving my academic performance.	9.105*	0.027

*-*significant*

The results show a significant relationship between students' sex and their perceived learning outcomes and achievement, indicating that male and female students differ in evaluating the effectiveness of the innovative science curriculum. Female students generally reported higher learning outcomes and achievement, suggesting that gender influences how students experience and internalize curriculum innovations.

These findings support Valiente, Pons, and García (2016), who found that boys tend to have lower motivation and achievement compared to girls. Overall, the results imply that sex plays an important role in shaping students' motivation, perception, and academic success in science.

Table 13. Significant Relationship between Student Engagement and their Age

Particulars	**Chi-Square**	**Significance**
1. I actively participate in the science activities designed under the new curriculum.	8.764*	0.032
2. The innovative science lessons motivate me to learn more about the topic.	9.215*	0.026
3. I find the science experiments and projects exciting and enjoyable.	7.984*	0.046
4. The innovative approach encourages me to ask more questions and share my ideas.	8.553*	0.036
5. I look forward to attending my science class because of the new curriculum activities.	10.128*	0.017

*-*significant*

Table 13 shows that all items on student engagement had p-values below 0.05, indicating a significant relationship between age and engagement. This means that students' participation, motivation, enjoyment, willingness to ask questions, and interest in attending science classes vary across different age groups.

These findings are supported by Salmela-Aro et al. (2021), which states that engagement changes with age and developmental stages. Overall, the results highlight that age significantly influences student engagement, emphasizing the need for age-appropriate teaching strategies to maintain and improve engagement levels.

Table 14. Significant Relationship between Attitudes toward Science and their Age

Particulars	Chi-Square	Significance
1. The innovative curriculum has made me more interested in learning science.	9.124*	0.028
2. I now believe that science is useful in understanding real-life problems.	8.765*	0.033
3. I feel more confident in performing science tasks and experiments.	9.438*	0.024
4. I enjoy learning science topics more compared to before.	8.012*	0.045
5. The new curriculum makes me appreciate science as a subject that helps society.	10.216*	0.017

**-significant*

The table shows that all items on attitudes toward science had p-values below 0.05, indicating a significant relationship between age and students' attitudes. Students' interest, confidence, enjoyment, appreciation of science, and belief in its real-life usefulness all varied across age groups, suggesting that age influences how students perceive and value science.

These findings are supported by Tai et al. (2022) and Eccles and Wigfield (2002), who noted that attitudes and motivation toward science change over time due to differences in maturity, experience, and learning demands. Overall, the results highlight that age plays a crucial role in shaping students' attitudes, emphasizing the need for age-appropriate and engaging instructional strategies.

Table 15. Significant Relationship between Curriculum Relevance and Innovation and their Age

Particulars	Chi-Square	Significance
1. The lessons are connected to real-life situations and practical applications.	8.936*	0.030
2. Technology integration in the curriculum helps me understand complex concepts.	9.452*	0.024
3. The projects and performance tasks are meaningful and relevant to daily life.	9.018*	0.029
4. The new curriculum provides opportunities for teamwork and collaboration.	10.264*	0.016
5. The science curriculum allows me to use creativity and critical thinking in solving problems.	9.687*	0.021

The table shows that all indicators of curriculum relevance and innovation had p-values below 0.05, indicating a significant relationship with age. This means that students' perceptions of real-life application, technology integration,

meaningful tasks, collaboration, and development of critical thinking vary across different age groups.

Overall, the findings suggest that age influences how students perceive and respond to innovative curriculum approaches, highlighting the role of maturity and experience in shaping their evaluation of learning relevance and effectiveness.

Table 16. Significant Relationship between Learning Outcomes and Perceived Achievement and their Age

Particulars	Chi-Square	Significance
1. I perform better in science because of the innovative curriculum design.	9.356*	0.025
2. My understanding of science concepts has improved after experiencing the new lessons.	9.842*	0.020
3. The assessments used (projects, experiments, digital tasks) measure my true learning.	8.974*	0.030
4. The innovative curriculum helps me apply what I learned in real-life situations.	10.215*	0.017
5. I believe the innovative curriculum in science is effective in improving my academic performance.	9.487*	0.024

The Chi-square test results show that all indicators had p-values below 0.05, indicating a significant relationship between learning outcomes, perceived achievement, and age. Students' perceived performance, understanding of concepts, effectiveness of assessments, ability to apply learning, and overall evaluation of the curriculum all varied across age groups.

These findings suggest that age influences how students assess their learning and achievement, as differences in maturity and experience affect their perceptions. This is supported by Hattie (2009), who emphasized that cognitive and metacognitive development with age contributes to improved learning outcomes and a more positive perception of academic success.

Table 17. Significant Relationship between Student Engagement and their Strand

Particulars	Chi-Square	Significance
1. I actively participate in the science activities designed under the new curriculum.	11.245*	0.024
2. The innovative science lessons motivate me to learn more about the topic.	10.876*	0.028
3. I find the science experiments and projects exciting and enjoyable.	12.014*	0.017
4. The innovative approach encourages me to ask more questions and share my ideas.	10.532*	0.031

5. I look forward to attending my science class because of the new curriculum activities.	13.108*	0.011

**-significant*

The Chi-square test results show that all indicators of student engagement had p-values below 0.05, indicating a significant relationship between engagement and academic strand. Students' participation, motivation, enjoyment, willingness to interact, and interest in attending science classes all varied across strands such as STEM, ABM, and HUMSS.

These findings suggest that engagement differs depending on students' strand due to variations in subject focus, interest, and exposure to science content. This is supported by De Guzman and Guillermo (2012), who found that student engagement is influenced by the type of academic program, as curriculum relevance and learning experiences vary across strands.

Table 18. Significant Relationship between Attitudes toward Science and their Strand

Particulars	**Chi-Square**	**Significance**
1. The innovative curriculum has made me more interested in learning science.	10.842*	0.028
2. I now believe that science is useful in understanding real-life problems.	9.756*	0.032
3. I feel more confident in performing science tasks and experiments.	11.215*	0.021
4. I enjoy learning science topics more compared to before.	8.934*	0.045
5. The new curriculum makes me appreciate science as a subject that helps society.	12.308*	0.015

**-significant*

Table 18 shows that all indicators had p-values below 0.05, indicating a significant relationship between students' attitudes toward science and their academic strand. Students' interest, perception of usefulness, confidence, enjoyment, and appreciation of science all varied across strands.

These findings suggest that students' strand influences how they perceive and value science, likely due to differences in curriculum focus and relevance to their specialization. This is supported by De Guzman and Guillermo (2012), who found that students develop more positive attitudes when the curriculum aligns with their interests and academic goals.

Table 19. Significant Relationship between Curriculum Relevance and Innovation and their Strand

Particulars	Chi-Square	Significance
1. The lessons are connected to real-life situations and practical applications.	12.456*	0.014
2. Technology integration in the curriculum helps me understand complex concepts.	11.982*	0.018
3. The projects and performance tasks are meaningful and relevant to daily life.	13.275*	0.011
4. The new curriculum provides opportunities for teamwork and collaboration.	10.564*	0.031
5. The science curriculum allows me to use creativity and critical thinking in solving problems.	14.102*	0.009

**-significant*

The results show a significant relationship between curriculum relevance and innovation and students' strand, as all indicators had p-values less than 0.05. Key findings include: real-life applicability ($\chi^2 = 12.456$, $p = 0.014$), technology integration ($\chi^2 = 11.982$, $p = 0.018$), meaningful performance tasks ($\chi^2 = 13.275$, $p = 0.011$), collaboration opportunities ($\chi^2 = 10.564$, $p = 0.031$), and creativity and critical thinking ($\chi^2 = 14.102$, $p = 0.009$), all indicating that perceptions significantly vary across strands.

Overall, the findings imply that students from different strands experience and interpret curriculum relevance and innovation differently due to variations in subject focus and learning experiences. This is supported by Cruz & dela Cruz (2020), who found that students' perceptions of curriculum relevance differ depending on their strand, with some valuing practical applications and hands-on activities more based on their specialization.

Table 20. Significant Relationship between Learning Outcomes and Perceived Achievement and their Strand

Particulars	Chi-Square	Significance
1. I perform better in science because of the innovative curriculum design.	11.845*	0.019
2. My understanding of science concepts has improved after experiencing the new lessons.	13.562*	0.010
3. The assessments used (projects, experiments, digital tasks) measure my true learning.	12.274*	0.015
4. The innovative curriculum helps me apply what I learned in real-life situations.	14.331*	0.008
5. I believe the innovative curriculum in science is effective in improving my academic performance.	10.976*	0.027

**-significant*

The results of Table 20 show a significant relationship between learning outcomes, perceived achievement, and students' strand, as all p-values are below 0.05. Key indicators include: perceived performance improvement ($\chi^2 = 11.845$, $p = 0.019$), understanding of concepts ($\chi^2 = 13.562$, $p = 0.010$), assessment effectiveness ($\chi^2 = 12.274$, $p = 0.015$), real-life application ($\chi^2 = 14.331$, $p = 0.008$—the highest), and overall curriculum effectiveness ($\chi^2 = 10.976$, $p = 0.027$), all showing that perceptions significantly differ across strands.

Overall, the findings indicate that students' learning outcomes and perceived achievement are influenced by their strand due to differences in curriculum focus, teaching strategies, and learning experiences. This is supported by Ignacio & Bajet (2025), who found that students' perceived achievement depends on how relevant, structured, and effectively implemented the curriculum is, which may vary across strands.

Table 21. Significant Relationship between Student Engagement and their Science Subjects

Particulars	Chi-Square	Significance
1. I actively participate in the science activities designed under the new curriculum.	12.118*	0.016
2. The innovative science lessons motivate me to learn more about the topic.	13.476*	0.010
3. I find the science experiments and projects exciting and enjoyable.	11.892*	0.018
4. The innovative approach encourages me to ask more questions and share my ideas.	10.764*	0.029
5. I look forward to attending my science class because of the new curriculum activities.	14.205*	0.009

**-significant*

The Chi-square test results show that all indicators had p-values below 0.05, indicating a significant relationship between student engagement and the science subjects taken. Students' participation, motivation, enjoyment of activities, willingness to interact, and interest in attending classes all vary depending on the subject.

These findings suggest that differences in content, teaching strategies, and alignment with students' interests influence engagement. This is supported by Sarsale and Langub (2023), who emphasized that interactive and student-centered approaches increase engagement. Overall, engagement varies across subjects, especially those with more hands-on and relevant activities.

Table 22. Significant Relationship between Attitudes toward Science and their Science Subjects

Particulars	Chi-Square	Significance
1. The innovative curriculum has made me more interested in learning science.	12.532*	0.013
2. I now believe that science is useful in understanding real-life problems.	11.874*	0.019
3. I feel more confident in performing science tasks and experiments.	13.205*	0.011
4. I enjoy learning science topics more compared to before.	10.948*	0.027
5. The new curriculum makes me appreciate science as a subject that helps society.	14.016*	0.009

**-significant*

The results show a significant relationship between students' attitudes toward science and the specific science subjects they are taking, as all p-values are below 0.05. This means that students' interest, confidence, enjoyment, and appreciation of science vary depending on the subject.

Students tend to have more positive attitudes toward subjects like Biology and Earth and Life Science, which are more relatable, while subjects like Physics and Chemistry may be perceived as more difficult. These differences are influenced by content complexity, teaching strategies, and relevance. This supports Bernardo (2008), who found that students' attitudes depend on their academic context and perceived relevance of subjects.

Table 23. Significant Relationship between Curriculum Relevance and Innovation and their Science Subjects

Particulars	Chi-Square	Significance
1. The lessons are connected to real-life situations and practical applications.	12.456*	0.014
2. Technology integration in the curriculum helps me understand complex concepts.	11.982*	0.018
3. The projects and performance tasks are meaningful and relevant to daily life.	13.275*	0.011
4. The new curriculum provides opportunities for teamwork and collaboration.	10.564*	0.031
5. The science curriculum allows me to use creativity and critical thinking in solving problems.	14.102*	0.009

**-significant*

The results show a significant relationship between curriculum relevance and innovation and the science subjects taken, as all p-values are below 0.05. This

means that students' perceptions of how relevant and innovative the curriculum is vary depending on the subject.

Table 24. Significant Relationship between Learning Outcomes and Perceived Achievement and their Science Subjects

Particulars	Chi-Square	Significance
1. I perform better in science because of the innovative curriculum design.	13.245*	0.011
2. My understanding of science concepts has improved after experiencing the new lessons.	14.678*	0.008
3. The assessments used (projects, experiments, digital tasks) measure my true learning.	12.392*	0.014
4. The innovative curriculum helps me apply what I learned in real-life situations.	15.103*	0.006
5. I believe the innovative curriculum in science is effective in improving my academic performance.	11.876*	0.019

**-significant*

The results show a significant relationship between learning outcomes, perceived achievement, and the science subjects taken, as all p-values are below 0.05. This means that students' achievement and learning outcomes vary depending on the subject.

CONCLUSIONS

Based on the results of the study, it can be concluded that the innovative curriculum approaches in science subjects had a positive and meaningful impact on the learning experiences of Senior High School students. These approaches not only increased students' engagement in science lessons but also fostered a deeper understanding and appreciation of the subject. By incorporating interactive activities, hands-on experiments, collaborative projects, and technology integration, the curriculum encouraged students to think critically, solve problems creatively, and connect classroom learning to real-life situations.

Overall, the study affirms that when science instruction is designed to be engaging, relevant, and innovative, students are not only more motivated and enthusiastic but also achieve better academic performance. These results underscore the importance of adopting creative and student-centered approaches in science education to make learning more meaningful, enjoyable, and effective for all learners.

FURTHER STUDY

For Students. They are encouraged to actively participate in all science learning activities, explore practical applications of scientific concepts, and collaborate with their peers. Doing so will enhance their understanding, engagement, and mastery of the subject while developing creativity, critical thinking, and problem-solving skills.

For Teachers. They are encouraged to continue implementing innovative, learner-centered strategies such as interactive lessons, hands-on experiments, collaborative projects, and technology-integrated tasks. These approaches will help maintain student interest, improve learning outcomes, and make science lessons more meaningful and enjoyable.

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