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Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance

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Abstract— *This study aimed to determine inclusive students' progressive learning and interactive reinforcement, and performance using the Chem-Inspire Chemistry Worksheet. Employing a quantitative experimental research design, the study involved 200 TVL Grade 11 students from Biñan City Senior High Schools – San Antonio Campus, selected via purposive sampling. Data were collected using a validated self-made questionnaire to asses worksheet components, characteristics, progressive learning, and interactive reinforcement, along with a 30-item DepEd-aligned chemistry summative test. Statistical analyses included descriptive statistics, such as mean and standard deviation were used, also inferential statistics namely Pearson-r correlation, and t-tests. Findings revealed that worksheet components were perceived as "Very High" in effectiveness, and All four dimensions of progressive learning were rated "Very High," , also interactive reinforcement was strongly agreed "Very High", while Students performance achieved "Proficient" performance, where statistically significant positive correlations existed between the worksheet and progressive learning and interactive reinforcement, with a significant effect on the Chem-Inspire Chemistry worksheets for inclusive students' performance. The study concludes that Chem-Inspire was a significant relationship between Chem-Inspire Chemistry worksheet and inclusive students progressive learning. Likewise with the interactive reinforcement. Accordingly, there was a significant effect between the Chem-Inspire chemistry worksheet for inclusive students' performance. Recommendations were drawn such that, teachers were encouraged to include Chem-Inspire as a standard DepEd resource as supplemental worksheet, that could help students to strengthen problem solving skills and critical thinking, as well as for curriculum developers, that they may consider revising design and to consider its components and characteristics, the provision of resources, training and professional development for teachers to ensure the effective use to enhance students' performance, moreover future researchers were encouraged to explore a long term effect on the use of Chem-Inspire worksheet across diverse learning environment and students.*

Keywords— *Chemistry worksheets, inclusive education, progressive learning, interactive reinforcement, student performance, CHEMINSPIRE.*

I. INTRODUCTION

Inclusive education has become a cornerstone of modern pedagogy, aiming to integrate diverse learners, including those with disabilities, varying abilities, and diverse cultural backgrounds, into mainstream classrooms to ensure equitable access to quality education. However, in senior high school chemistry, persistent gaps in instructional materials hinder progress in learning and performance, necessitating targeted interventions such as CHEMI-INSPIRE worksheets.

In recent years, inclusive education policies have emphasized the importance of adaptable instructional materials to support diverse learners, particularly those with special educational needs (Naz, Zafar, & Ullah, 2024). Within chemistry education, interactive and scaffolded worksheets have emerged as promising tools to enhance student learning. For instance, Problem-Based Learning (PBL)-based interactive worksheets on atomic structure, developed using digital platforms such as iSpring Suite, have been shown to be valid, practical, and effective in improving both engagement and conceptual understanding (Sumanti et al., 2024). Similarly, "Smart Worksheets" used in introductory quantitative chemistry courses help students—especially those who struggle with mathematical aspects, develop stronger application skills and conceptual clarity (American Chemical Society, n.d.).

Despite these advances, accessibility-focused research continues to highlight persistent shortcomings in instructional and open educational resources (OERs), particularly for learners with disabilities. Common issues include unclear layouts, limited multimodal representations, and a lack of adjustable difficulty levels (Naz et al., 2024; Zhang et al., 2024). Moreover, chemistry education research has often prioritized visualization tools, such as simulations and animations, and inquiry-based approaches, while giving less attention to the structural design of worksheets themselves (Dorph et al., 2019). Consequently, there remains a lack of empirical studies that isolate how specific worksheet components—such as guided practice, reflection prompts, explicit objectives, feedback mechanisms, and sequenced tasks—impact learner outcomes.

Emerging studies begin to address these gaps. Bustos-Works (2021) demonstrated that structured, data-driven tasks can enhance students' self-efficacy and sense of belonging in STEM. Likewise, Essex (2023) emphasized the role of accessible materials, clear organization, and teacher support in reducing learning barriers. Tania et al. (2023) further highlighted the value of well-designed interactive e-worksheets, noting high ratings in usability and structure.

Building on this foundation, the present study, CHEM-INSPIRE, components and characteristics, investigates how purposeful worksheet design and accessibility features

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influence learning outcomes, engagement, and motivation among diverse senior high school chemistry students.

1.1 Statement of the Problem

Problem/s which were addressed by the research

The study is to determine the effectiveness of chem-inspire chemistry worksheets for inclusive students' progressive and interactive reinforcement of education. It seeks answers to the following questions.

1. What is the perceived level of chemistry worksheet components in terms of:
   1.1 learning objectives;
   1.2 concept presentation;
   1.3 guided practice; and
   1.4 assessment?
2. What is the perceived level of chemistry worksheets characteristics in terms of:
   2.1 accessibility;
   2.2 visual appeal;
   2.3 Interactive;
   2.4 scaffolding support; and
   2.5 adaptability?
3. What is the level of inclusive students' progressive learning as to
   3.1. cognitive development;
   3.2. skill mastery;
   3.3. retention of learning; and
   3.4. peer interaction?
4. What is the level of interactive reinforcement of education as to
   4.1. student engagement;
   4.2. collaboration;
   4.3. feedback responsive; and
   4.4. motivation?
5. What is the level of students' performance in Chemistry in terms of summative test?
6. Is there a significant relationship between Chem-Inspire chemistry worksheet and Inclusive Students' Progressive Learning?
7. Is there a significant relationship between Chem-Inspire chemistry worksheet and interactive reinforcement?
8. Is there a significant effect between the Chem-inspire Chemistry Worksheets on the students' Performance in chemistry?

II. Methodology

Employing a quantitative experimental research design, the study involved 200 TVL Grade 11 students from Biñan City Senior High Schools – San Antonio Campus, selected via purposive sampling. Data were collected using a validated self-made questionnaire to asses worksheet components, characteristics, progressive learning, and interactive reinforcement, along with a 30-item DepEd-aligned chemistry summative test. Statistical analyses included descriptive statistics, such as mean and standard deviation were used, also inferential statistics namely Pearson-r correlation, and t-tests.

III. Results and Discussion

This chapter deals with the presentation, analysis, and interpretation of data gathered to answer the sub-problem relative to the main problem of this study. This part discusses the findings of the study based on the questions.

Level of Chemistry Worksheet Components

In this study, the level of Chemistry Worksheet Components referred to the key elements included in the worksheet, namely Learning Objectives, Concept Presentation, Guided Practice, and Assessment. These components were important in organizing the lesson and supporting students in understanding chemistry concepts in a clear and systematic manner.

The learning objectives provide clear goals that guide students on what they were expected to learn after completing the worksheet. The concept presentation introduced and explained the chemistry topics in a structured and understandable way. Meanwhile, guided practice provided activities that allow students to apply the concepts they have learned, while the assessment evaluates students' understanding and mastery of the lesson.

These components helped improve students' engagement, critical thinking, and problem-solving skills while studying chemistry. Through well-designed worksheets, students were encouraged to actively participate in the learning process and develop a deeper understanding of scientific concepts. The level of the Chemistry Worksheet Components was presented in the following tables, which include the statements, mean, standard deviation, remarks, and verbal interpretation. These statistical measures were used to determine the respondents' level of agreement regarding the effectiveness and quality of the worksheet components in supporting the teaching and learning process.

Table 1. Level of Chemistry Worksheet Components in terms of Learning Objectives

Statement The learning objectives of the chemistry worksheet …	Mean	SD	Remarks
. . . are clearly stated and easy to understand.	4.56	0.68	Strongly Agree
. . . are appropriate for the learners' cognitive level.	4.67	0.63	Strongly Agree
. . . guide me to organize my learning, and study effectively.	4.61	0.63	Strongly Agree
. . . promote learners' expected outcomes.	4.34	0.74	Strongly Agree
Weighted Mean	4.55		
SD	0.68		
Verbal Interpretation	Very High		

Table 1 presents the level of Chemistry Worksheet Components in terms of Learning Objectives as perceived by the respondents.

The results indicated that the learning objectives were clearly stated, aligned with the content of the worksheet, and appropriate for the learners' cognitive level. They also guide students in organizing their study effectively and understanding the expected outcomes of each lesson. Respondents strongly agree that the objectives helped them

Rosalyn B. Misa, "Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 9, Issue 1, pp. 287-301, 2026.

focus on key concepts and provided a clear direction for their learning process.

The weighted mean of 4.55 with a standard deviation of 0.68 indicates a very high level of Chemistry Worksheet Components in terms of learning objectives. This signifies that the worksheets effectively communicated intended learning outcomes, helping students structure their learning and engaged with the content in a meaningful way. Clear and well-defined objectives enhanced students' ability to monitor their own progress and achieved desired academic results.

In summary, the findings revealed that learning objectives in chemistry worksheets were highly evident and effectively designed. They provided clarity, guidance, and purpose, which contributed to organized, focused, and goal-oriented learning experiences for students. Well-structured learning objectives played a crucial role in fostering comprehension, motivation, and academic attainment.

Table 2. Level of Chemistry Worksheet Components in terms of Concept Presentation

STATEMENT The concept presentation of the chemistry worksheet is . . .	MEAN	SD	REMARKS
. . . clearly presented and well explained	4.50	0.66	Strongly Agree
. . . logically presented in an organized manner	4.52	0.69	Strongly Agree
. . . connect new ideas to prior knowledge.	4.52	0.66	Strongly Agree
. . . provided examples, help me better understand the lesson	4.43	0.68	Strongly Agree
. . . interesting and engaging.	4.52	0.66	Strongly Agree
Weighted Mean	4.49		
SD	0.67		
Verbal Interpretation	Very High		

Table 2 illustrates the level of Chemistry Worksheet Components in terms of Concept Presentation as perceived by the respondents.

These findings revealed that the worksheets present chemistry concepts clearly and logically, facilitating students' connections between current ideas and prior knowledge. Embedded examples enhanced comprehension, while the engaging format sustains student interest. Students specifically praised the structured and appealing communication of concepts, with a weighted mean of 4.49 (SD= 0.67). The level of concept presentation was rated as highly acceptable, reflecting students' perceptions of the worksheets as informative, coherent, and accessible, promoting better understanding and retention of chemistry lessons.

In summary, the concept presentation effectively supports learning by bridging prior knowledge with updated content and maintaining students' curiosity and engagement.

Table 3 depicts the level of Chemistry Worksheet Components in terms of Guided Practice as observed by the respondents.

Respondents indicated that the guided practice sections effectively facilitated the step-by-step application of chemistry concepts. The inclusion of clear instructions and structured problem sets enables students to solve tasks accurately, gradually build confidence, and transition toward independent learning. These exercises promoted systematic learning by allowing students to reinforce their understanding through organized and progressive practice. This finding was supported by Riccomini and Morano (2019), who emphasized that guided practice with explicit instruction and worked examples helped learners to better understand complex, multi-step problems.

Table 3. Level of Chemistry Worksheet Components in terms of Guided Practice

STATEMENT The guided practice of the chemistry worksheet is. . .	MEAN	SD	REMARKS
. . . In step-by-step applied to concepts	4.65	0.62	Strongly Agree
. . . clear and easy-to-follow instructions.	4.62	0.64	Strongly Agree
. . . solved problems correctly.	4.61	0.62	Strongly Agree
. . . build confidence in solving chemistry problems.	4.47	0.72	Strongly Agree
. . . prepare for an independent learning task.	4.51	0.66	Strongly Agree
Weighted Mean	4.57		
SD	0.66		
Verbal Interpretation	Very High		

In addition, the high rating suggests that students perceived guided practice as a valuable component of the learning process in chemistry. Learners could concentrate on understanding rather than speculating on processes because the organized activities probably decreased cognitive load by decomposing abstract ideas into manageable stages. This structured approach also promoted active engagement, as students were required to apply concepts immediately after instruction, thereby strengthening retention and procedural fluency in solving chemistry problems.

The computed weighted mean of 4.57 with a standard deviation of 0.66 indicated a very high accepted level of guided practice among respondents. This suggests that the worksheets provide effective scaffolding that enables students to practice, apply, and consolidate their knowledge efficiently.

In summary, guided practice activities were intentionally designed to strengthen students' problem-solving abilities and confidence. They function as a supportive instructional mechanism that reinforces learning and prepares students for independent application.

Table 4. Level of Chemistry Worksheet Components in terms of Assessment

Statement The assessment in the chemistry worksheet . . .	MEAN	SD	REMARKS
. . . measure my understanding of the concepts	4.63	0.62	Strongly Agree
. . . improve my learning.	4.56	0.62	Strongly Agree
. . . are appropriate to level of learning.	4.52	0.67	Agree
. . . provide opportunities to check own progress.	4.39	0.67	Strongly Agree
. . .Identify areas where I need improvement.	4.19	0.65	Agree
Weighted Mean	4.53		
SD	0.66		
Verbal Interpretation	Very High		

Rosalyn B. Misa, "Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 9, Issue 1, pp. 287-301, 2026.

Table 4 shows the level of Chemistry Worksheet Components in terms of Assessment as experienced by the respondents.

The assessment tasks aligned with the lesson objectives and enabled students to measure their understanding of the material. Respondents highlighted that the worksheets help them track progress and identify areas for improvement, while most questions were appropriate for their cognitive level. The assessments also encourage reflection on personal learning achievements.

The weighted mean of 4.53 and a standard deviation of 0.66 indicated that the assessment component was accepted. This suggests that students perceived the assessments as helpful tools for reinforcing understanding, evaluating performance, and supporting self-directed learning.

In summary, the assessment sections of the worksheets provided meaningful opportunities for self-evaluation, reinforced learned concepts, and guided students toward mastery of chemistry skills.

Level of Chemistry Worksheet Characteristics

In this study, the level of Chemistry Worksheet Characteristics refers to the important qualities of the worksheet that support students' learning. These characteristics include Accessibility, Visual Appeal, Interactivity, Scaffolding Support, and Adaptability. These factors help ensure that the worksheet is easy to understand, engaging, and appropriate for the learning needs of students.

Accessibility refers to how easily students can read, understand, and follow the instructions provided in the worksheet. Visual appeal focuses on the layout, design, and organization that make the worksheet attractive and engaging. Interactivity allowed students to actively participate in learning through different activities and exercises. Scaffolding support helps guide students step-by-step in understanding complex chemistry concepts, while adaptability ensures that the worksheet can be used by students with different learning abilities and needs.

The level of Chemistry Worksheet Characteristics is presented in the following tables, which include the statements, mean, standard deviation, remarks, and verbal interpretation. These statistical measures were used to determine the respondents' level of agreement regarding the quality and effectiveness of the worksheet characteristics.

Table 5 illustrates the level of Chemistry Worksheet Characteristics in terms of Accessibility.

The data revealed that students perceived the chemistry worksheets as very high accessible across all measured dimensions, with every item earning a "Strongly Agree" rating. The individual item ranges from 4.30 (easy to navigate) to 4.48 (encouraged everyone to participate), indicating consistent positive feedback. The lowest means (4.30) relates to navigation, suggesting that, while still highly acceptable, there was room for improvement in page layout or directional cues. The highest mean (4.48) for "encourage everyone to participate" highlights the worksheets' strength in fostering inclusive engagement, a critical goal in diverse classrooms.

Table 5. Level of Chemistry Worksheet Characteristics in terms of Accessibility

STATEMENT The Accessibility of chemistry worksheet are . . .	MEAN	SD	REMARKS
. . . simple and easy understand	4.38	0.69	Strongly Agree
. . . Design that suits learning needs.	4.40	0.72	Strongly Agree
. . . easy to navigate.	4.30	0.72	Strongly Agree
. . . clear content and instructions	4.42	0.69	Strongly Agree
. . . encourage everyone to participate	4.48	0.68	Strongly Agree
Weighted Mean	4.40		
SD	0.70		
Verbal Interpretation	Very High		

The weighted mean of 4.40 (SD = 0.70) falls under the verbal interpretation of "Very High" accessibility, confirming that the worksheets were user-friendly, clearly structured, and supportive of all learners. The low standard deviations (0.68–0.72) show strong agreement among respondents, meaning students' experiences were consistently positive rather than mixed.

These findings have important implications for chemistry instruction in Philippine senior high schools, especially in inclusive and progressive learning settings. The high accessibility score validated the effectiveness of scaffolded, well-designed worksheets in making abstract chemistry concepts such as chemical bonding, types of chemical reactions, balancing chemical equations, and stoichiometry more comprehensible to learners with varying abilities, including those with learning difficulties or language barriers.

Table 6. Level of Chemistry worksheet characteristics in terms of Visual Appeal

STATEMENT The visual appeal of the chemistry worksheets . . .	MEAN	SD	REMARKS
. . . are attractive and easy to follow.	4.48	0.72	Strongly Agree
. . . have helpful diagrams, tables, and illustrations	4.50	0.66	Strongly Agree
. . . layouts are tasks focus	4.57	0.64	Strongly Agree
. . . are engaging through colors and graphics	4.61	0.57	Strongly Agree
. . . are enjoyable	4.62	0.62	Strongly Agree
Weighted Mean	4.55		
SD	0.64		
Verbal Interpretation	Very High		

Table 6 presents the level of Chemistry Worksheet Characteristics in terms of visual appeal.

Respondents reveal that visual appeal of the chemistry worksheets was rated "Very High" (weighted mean = 4.55**,** SD = 0.64), with all items earning a "Strongly Agree" rating, indicating that students find the materials not only aesthetically pleasing but also functionally effective in supporting learning. The highest-rated item was "are enjoyable" (Mean = 4.62), followed closely by "are engaging

Rosalyn B. Misa, "Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 9, Issue 1, pp. 287-301, 2026.

through colors and graphics" (Mean = 4.61), showing that students strongly appreciated the enjoyable and visually stimulating nature of the worksheets. The item "layout is task-focused" received a mean of 4.57**,** confirming that the organized structure helped students concentrate on learning tasks without distraction, while "have helpful diagrams, tables, and illustrations" scored 4.50, highlighting the value of visual aids in clarifying abstract chemistry concepts. Even the lowest-rated item, "are attractive and easy to follow" (Mean = 4.48), remains in the "Strongly Agree**"** range, with the consistently low standard deviations (0.57–0.72) reflecting strong consensus among students that the visual experience was uniformly positive.

These findings have important implications for chemistry instruction in Philippine senior high schools, particularly in inclusive and progressive learning settings, as they validate the effectiveness of attractive, well-designed worksheets in making abstract topics like chemical bonding, types of chemical reactions, balancing chemical equations, and stoichiometry more comprehensible and engaging for learners with varying abilities, including those with learning difficulties or language barriers.

Ultimately, the very high visual appeal of these worksheets promotes equity in science education, enabling all students regardless of ability or background to follow, understand, enjoy, and actively participate in chemistry learning without difficulty.

Table 7. Level of Chemistry Worksheet Characteristics in terms of Interactivity

STATEMENT The interactivity of chemistry worksheet . . .	MEAN	SD	REMARKS
. . . encourage to actively participate in learning.	4.55	0.67	Strongly Agree
. . . require me to think and respond.	4.48	0.68	Strongly Agree
test my understanding.	4.51	0.66	Strongly Agree
. . . motivate me to explore concepts independently.	4.54	0.67	Strongly Agree
. . . involve me in my learning.	4.50	0.68	Strongly Agree
Weighted Mean	4.51		
SD	0.67		
Verbal Interpretation	Very High		

Table 7 presents the level of Chemistry Worksheet Characteristics in terms of Interactivity.

The data showed that students were actively engaged with the chemistry worksheets, as tasks encourage thinking, prompt responses, and foster independent exploration of concepts. Learners reported feelings as they interact with the content and test their understanding. The interactivity of the worksheets was rated very high by respondents, with a weighted mean of 4.51 (SD = 0.67), indicating a "Very High" level of agreement. Each item received a "Strongly Agree" rating, with means ranging from 4.48 to 0.55, indicating that the worksheet effectively encourages active participation, requires critical thinking, tests understanding, motivates independent exploration, and directly involves students in their learning. This highly accepted level of interactivity reflects that interactive worksheets foster deeper engagement, critical thinking, and self-directed learning among students.

Overall, the interactive features support active participation and encourage students to take ownership of their learning process.

Table 8. Level of Chemistry Worksheet: Characteristics of Guided Practice

STATEMENT The guided practice of chemistry worksheet . . .	MEAN	SD	REMARKS
. . . provide guidance to understand new topics.	4.48	0.72	Strongly Agree
. . . encourage to complete challenging tasks	4.50	0.66	Strongly Agree
. . . help me learn better through hints and examples	4.57	0.64	Strongly Agree
. . . gives confidence when attempting activities.	4.61	0.57	Strongly Agree
. . . helps me gradually learn on my own.	4.62	0.62	Strongly Agree
Weighted Mean	4.55		
SD	0.64		
Verbal Interpretation	Very High		

Table 8 demonstrates the level of Chemistry Worksheet Characteristics in terms of Scaffolding Support.

The guided practice component of the chemistry worksheet received a Highly Accepted rating, with a weighted mean of 4.55 (SD = 0.64), indicating that students strongly agree it effectively supports their learning journey. Each item earned a "Strongly Agree" remark, with means ranging from 4.48 to 4.62, reflecting that the worksheet successfully provided guidance for understanding new topics (4.48), encouraged completion of challenging tasks (4.50), enhanced learning through hints and examples (4.57), built confidence when attempting activities (4.61), and promote gradual independence in learning (4.62). The highest mean (4.62) for "helps me gradually learn on my own" suggests that the scaffolded design effectively transitions students from supported practice to self-directed mastery. Students further reported that the worksheets provided ample support for learning, helping them measure understanding and tracked progress. Assessment tasks aligned with lesson objectives, are appropriate for cognitive levels, and guide students to identify areas for improvement. With a weighted mean of 4.58 (SD = 0.66), scaffolding support was highly accepted, confirming that structured guidance within the worksheets helps students gradually build knowledge, confidence, and skills in chemistry.

These results demonstrated that well-structured guided practice reduced cognitive overload, particularly in abstract chemistry concepts, by offering timely hints, worked examples, and incremental challenges that build both competence and confidence. One way scaffolding supports learning was by breaking down complex tasks into smaller, more manageable parts.

Table 9 depicts the level of Chemistry Worksheet Characteristics in terms of Adaptability.

Rosalyn B. Misa, "Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 9, Issue 1, pp. 287-301, 2026.

Table 9. Level of Chemistry Worksheet Characteristics in terms of Adaptability

STATEMENT The adaptability of chemistry worksheet . . .	MEAN	SD	REMARKS
. . .adjust the pace of my learning	4.49	0.66	Strongly Agree
. . .allow to practice at my level of understanding.	4.53	0.62	Strongly Agree
. . .modify approach to solve problems based	4.46	0.69	Strongly Agree
. . .suit different learning styles in our class.	4.52	0.72	Strongly Agree
. . .help me learn more effectively.	4.59	0.67	Strongly Agree
Weighted Mean	4.52		
SD	0.67		
Verbal Interpretation	Very High		

Respondents expressed that the worksheets allowed adjustments in learning pace and accommodated different learning styles. Students could modify approaches to problem-solving, practice according to their level, and use worksheets flexibly to enhance understanding. A weighted mean of 4.52 and a standard deviation of 0.67 indicated that adaptability was very high. This highlights adaptable worksheets support personalized learning, allowing students to tailored fit individual needs and learning preferences. In summary, adaptable worksheets provided flexibility that promotes independent learning, accommodates diverse learning styles, and helped students optimize their educational experience.

Level of Inclusive Student's Progressive Learning

Progressive learning in an inclusive setting emphasized the critical importance of differentiated instruction, adaptive materials, and learner-centered strategies that respond to individual differences. This approach ensured that students were not merely present in the classroom but were actively engaged and capable of achieving incremental academic growth.

The progressive learning of inclusive students was assessed by examining the effectiveness of instructional interventions, such as innovative worksheets, scaffolded activities, and interactive learning tools.

In the context of this study, examining the level of inclusive students' progressive learning was crucial for evaluating the impact of instructional materials, such as chemistry worksheets, on student development. These provided a basis for understanding how inclusive and interactive approaches contributed to improved learning outcomes and sustained academic growth among diverse groups of learners.

For this study, the level of Inclusive Students' Progressive Learning refers to the improvement and development of students' learning over time within an inclusive learning environment. It focused on how students gradually built their knowledge, skills, and ability to interact with others while participating in classroom activities. Progressive learning was examined across four dimensions: Cognitive Development, Skill Mastery, Retention of Learning, and Peer Interaction. Cognitive development refers to students' ability to understand concepts, think critically, and process information. Skill mastery involves the capability to apply learned knowledge and perform tasks effectively. Moreover, it also focuses on the ability to remember and recall previously learned concepts, while peer interaction highlights the ability to collaborate, communicate, and learn with classmates to collectively reflect the holistic growth of learners in inclusive settings, where both academic and social-emotional outcomes were valued.

The level of Inclusive Students' Progressive Learning was presented in the table below, which includes the mean, standard deviation, and verbal interpretation. These statistical measures were used to determine the respondents' assessment of students' progressive learning in the inclusive classroom setting.

Table 10. Level of Inclusive Student's Progressive Learning in terms of Cognitive Development

STATEMENT The cognitive development of chemistry worksheet . . .	MEAN	SD	REMARKS
. . . better understand chemistry concepts	4.57	0.67	Strongly Agree
. . . help to think critically when solving problems.	4.53	0.66	Strongly Agree
. . . connect new chemistry ideas with what already know.	4.52	0.69	Strongly Agree
. . . improved problem-solving skills	4.60	0.66	Strongly Agree
. . . explain chemistry concepts in my own words	4.45	0.74	Strongly Agree
Weighted Mean	4.53		
SD	0.69		
Verbal Interpretation	Very High		

Table 10 illustrates the level of students' cognitive development as influenced by using worksheets.

This data revealed that the chemistry worksheet is highly effective in promoting students' cognitive development, with a weighted mean of 4.53 (SD = 0.69) interpreted as "Very High," demonstrating that it serves as a powerful inclusive learning tool for diverse learners. All five indicators received "Strongly Agree" ratings, showing that students consistently perceived significant benefits across multiple cognitive domains, with the highest mean for improved problem-solving skills (4.60), followed by better understanding of chemistry concepts (4.57), critical thinking when solving problems (4.53), connecting new chemistry ideas with prior knowledge (4.52), and explaining concepts in their own words (4.45). The low standard deviations (ranging from 0.66 to 0.74) indicate strong consensus among respondents, meaning the worksheet benefited most students uniformly, including inclusive learners with varying abilities rather than just a select few.

The analysis showed that the worksheet successfully engaged students in higher-order thinking skills, including analysis, synthesis, and application, which were central to cognitive development in science education for all learners. The high rating for connecting current ideas with what students already know suggested that the worksheet effectively used scaffolding techniques, helping learners build on prior understanding, a key principle in constructivist learning that was particularly important for inclusive learners

who may need additional support to access abstract chemistry concepts. The strong critical thinking score aligned with research showing that problem-oriented chemistry learning develops essential skills such as problem identification, conceptual understanding, and conclusion.

Table 11. Level of Inclusive Student's Progressive Learning in terms of Skill Mastery

STATEMENT The skill mastery of chemistry worksheet . . .	MEAN	SD	REMARKS
. . . accurately perform tasks after practicing	4.39	0.69	Strongly Agree
. . . improve my laboratory and analytical skills.	4.42	0.73	Strongly Agree
. . . confident in applying chemistry knowledge to different problems.	4.45	0.71	Strongly Agree
. . . allow to practice skills until mastery	4.70	0.55	Strongly Agree
. . . independently complete exercises	4.51	0.71	Strongly Agree
Weighted Mean	4.49		
SD	0.69		
Verbal Interpretation	Very High		

Table 11 presents the level of skill mastery demonstrated by students while using the worksheets.

The data revealed that learners improved performance in chemistry tasks accurately, gained confidence in laboratory and analytical skills, and were able to apply knowledge to different problem-solving situations. The worksheets provide repeated opportunities for practice, allowing students to refine their skills, build confidence, and achieve mastery in various chemistry activities.

The weighted mean of 4.49 with a standard deviation of 0.69 indicates a highly progressive level of skill mastery. This shows that the worksheets successfully enhance students' practical abilities and support the development of proficiency in chemistry tasks, enabling independent performance and hands-on competence results to emphasize that CHEMINSPIRE worksheets contribute significantly to skill acquisition and mastery, ensuring students can perform and apply chemistry tasks effectively.

Teaching methods play an important role in mastering skills. Effective teaching strategies can improve students' understanding and retention of material. This approach allows students to learn at their own pace, providing them with opportunities to fully understand concepts. Additionally, integrating inclusive and interactive teaching approaches alongside mastery learning further strengthens students' skill development. Strategies such as differentiated instruction, scaffolded activities, and the use of structured worksheets enable teachers to address diverse learning needs while maintaining high academic expectations. These approaches provide multiple pathways for learners to engage with content, practice essential skills, and receive timely feedback. As a result, students become more actively involved in their learning process, which enhances motivation, deepens conceptual understanding, and supports continuous academic progress.

Table 12. Level of Inclusive Student's Progressive Learning in terms of Retention of Learning

STATEMENT The retention of learning of chemistry worksheets helps . . .	MEAN	SD	REMARKS
. . . remember the concepts learned for longer time.	4.41	0.74	Strongly Agree
. . . recall important information during class or exams.	4.52	0.70	Strongly Agree
. . . I can apply previously learned concepts to new topics.	4.46	0.72	Strongly Agree
. . . improves my long-term understanding	4.57	0.65	Strongly Agree
. . . retain knowledge effectively.	4.63	0.60	Strongly Agree
Weighted Mean	4.52		
SD	0.69		
Verbal Interpretation	Very High		

Table 12 highlights the level of retention of learning among students after engaging in the worksheets. The findings indicated that learners were able to retain chemistry concepts for an extended period, recall essential information during class or examinations, and apply prior knowledge to new topics. The worksheets' structured activities encourage repeated review, consolidation, and reinforcement, which strengthen memory retention and long-term understanding.

The weighted mean of 4.52 and a standard deviation of 0.69 indicates a highly progressive level of retention of learning. The data suggested that CHEMINSPIRE worksheets were effective in promoting enduring knowledge, supporting continuous learning, and enabling students to recall and utilize chemistry concepts confidently.

In summary, the findings revealed that the worksheets not only enhanced understanding but also ensured sustained retention, helping students maintain and apply their learning over time.

Table 13. Level of Inclusive Student's Progressive Learning in terms of Peer Interaction

STATEMENT The peer interaction of chemistry worksheet.	MEAN	SD	REMARKS
. . .Confidently understanding chemistry concepts when discussed/share	4.49	0.76	Strongly Agree
. . .helps me learn better with peers	4.49	0.68	Strongly Agree
. . .encourages me to ask questions and clarify doubts.	4.54	0.71	Strongly Agree
. . .makes the learning process more enjoyable and engaging.	4.63	0.60	Strongly Agree
. . .Improve the ability to solve problems.	4.60	0.60	Strongly Agree
Weighted Mean	4.55		
SD	0.68		
Verbal Interpretation	Very High		

Table 13 depicts the level of peer interaction fostered by the worksheets. Results showed that students benefit from collaborative activities, group discussions, and shared problem-solving exercises. Learners reported that working with peers improved their understanding of concepts, encouraged them to ask questions, clarifies doubts, and enhanced engagement. Collaborative tasks also made learning

Rosalyn B. Misa, "Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 9, Issue 1, pp. 287-301, 2026.

enjoyable and strengthened teamwork, communication, and social skills among students.

The weighted mean of 4.55 with a standard deviation of 0.68 indicates a very high level of peer interaction. This demonstrates that the worksheets created an interactive learning environment where students actively participated, exchanged ideas, and enhanced comprehension through collaboration.

In summary, the findings emphasized that worksheets effectively cultivated peer interaction, teamwork, and collaborative learning, which complemented cognitive and skill development in chemistry.

Level of Interactive Reinforcement of Education

In this study, the level of Interactive Reinforcement of Education refers to the strategies and activities that enhance students' learning through active participation and interaction during the teaching and learning process. It emphasized how instructional materials and classroom activities encourage students to become more involved and responsive in their learning.

Interactive Reinforcement of Education was examined in terms of Student Engagement, Collaboration, Feedback Responsiveness, and Motivation. Student engagement refers to the level of students' active participation and interest in the learning activities. Collaboration highlights the ability of students to work together, share ideas, and support each other in completing tasks. Feedback responsiveness refers to how students respond to guidance and corrections provided by teachers, while motivation reflects the students' willingness and enthusiasm to learn and participate in educational activities. These dimensions were grounded in social constructivist theories, such as Vygotsky's Zone of Proximal Development, which underscores the role of interactive scaffolds in building knowledge collaboratively, particularly vital for inclusive chemistry classrooms with diverse learners under DepEd standards. Data were gathered via a validated Likert-scale survey (1 = Strongly Disagree to 5 = Strongly Agree), ensuring reliable measurement of perceived effectiveness. High levels across these areas correlate with improved retention and performance in STEM subjects, as supported by meta-analyses like those from the Journal of Educational Psychology.

The level of Interactive Reinforcement of Education was presented in the following tables, which include the mean, standard deviation, and verbal interpretation to describe the respondents' assessment of the effectiveness of interactive reinforcement in the learning process.

Table 14 reveals the level of Interactive Reinforcement of Education, which refers to the strategies and activities that enhance students' learning through active participation and interaction during the teaching and learning process. This construct emphasizes how instructional materials and classroom activities encourage students to become more involved and responsive in their learning. In terms of Student Engagement, the chemistry worksheet achieved a weighted mean of 4.53 (SD = 0.66), with a verbal interpretation of "Very High." All five indicators received "Strongly Agree" ratings: students were motivated to participate in activities (M = 4.53, SD = 0.66), actively involved in learning (M = 4.54, SD = 0.68), enjoyed completing tasks and exercises (M = 4.55, SD = 0.66), stayed focused on learning (M = 4.50, SD = 0.65), and felt excited about studying chemistry (M = 4.53, SD = 0.65). The narrow range of means (4.50–4.55) and consistently low standard deviations (0.65–0.68) indicate strong agreement among respondents and minimal variability in their experiences, suggesting that the worksheet consistently engages diverse learners.

Table 14. Level of Interactive Reinforcement of Education in terms of Student Engagement

STATEMENT The student engagement of chemistry worksheet made me . . .	MEAN	SD	REMARKS
. . .motivated to participate in activities	4.53	0.66	Strongly Agree
. . .actively involved in learning	4.54	0.68	Strongly Agree
. . .enjoy completing tasks and exercises	4.55	0.66	Strongly Agree
. . .stay focused on learning	4.50	0.65	Strongly Agree
. . .excited about studying chemistry.	4.53	0.65	Strongly Agree
Weighted Mean	4.53		
SD	0.66		
Verbal Interpretation	Very High		

These findings demonstrated that interactive reinforcement provided by the worksheet effectively promoted behavioral, emotional engagement, and cognitive engagement. The level of student engagement underscores the worksheet's success as an instructional tool, supporting its integration into senior high school science curricula to enhance learning outcomes through active, enjoyable, and focused engagement with chemistry content. These dimensions were grounded in social constructivist theories, particularly Vygotsky's Zone of Proximal Development, which underscores the role of interactive scaffolds in collaboratively building knowledge, a principle especially vital for inclusive chemistry classrooms with diverse learners under DepEd standards. Data were gathered via a validated Likert-scale survey (1 = Strongly Disagree to 5 = Strongly Agree), ensuring reliable measurement of perceived effectiveness.

Table 15. Level of Interactive Reinforcement of Education in terms of Collaboration

STATEMENT The collaboration of chemistry worksheet . . .	MEAN	SD	REMARKS
. . .encourage discussion with classmates.	4.61	0.58	Strongly Agree
. . .allow collaboration when appropriate.	4.58	0.67	Strongly Agree
. . .support cooperative learning.	4.58	0.67	Strongly Agree
. . .promote sharing of ideas and solutions.	4.58	0.72	Strongly Agree
. . .are effective for both individual and group activities.	4.64	0.63	Strongly Agree
Weighted Mean	4.60		
SD	0.65		
Verbal Interpretation	Very High		

Table 15 presents the level of collaboration encouraged by the worksheets. The data indicated that students were frequently prompted to discuss concepts with classmates, shared ideas, and participated in cooperative learning activities. The worksheets provided opportunities for group interaction while also supporting independent tasks, creating a balanced environment for peer learning and teamwork. Students reported that collaboration helps clarify doubts, strengthens understanding, and enhances the enjoyment of learning chemistry. The weighted mean of 4.60 and a standard deviation of 0.65 signify a highly preserved level of collaborative reinforcement, reflecting that the worksheets effectively cultivate social learning, communication skills, and the exchange of ideas among peers.

In summary, the findings demonstrated that collaborative learning was strongly promoted through the worksheets, which enhance peer interaction, mutual support, and shared problem-solving experiences. Collaboration contributes to personal development by helping students to develop essential social skills such as communication, teamwork, and problem-solving.

Table 16. Level of Interactive Reinforcement of Education in terms of Feedback

STATEMENT The feedback of chemistry worksheet . . .	MEAN	SD	REMARKS
. . .improve my answers.	4.58	0.64	Strongly Agree
. . .guide me to correct mistakes and learn from them.	4.56	0.65	Strongly Agree
. . .confidently apply suggestions.	4.58	0.70	Strongly Agree
. . .helps me perform better in subsequent tasks.	4.54	0.62	Strongly Agree
. . .reflect on my learning based on the responses.	4.56	0.71	Strongly Agree
Weighted Mean	4.56		
SD	0.66		
Verbal Interpretation	Very High		

Table 16 illustrates the level of feedback reinforcement in students' learning using the worksheets. Results reveal that learners actively use feedback to improve answers, correct mistakes, reflect on performance, and gain confidence in applying suggestions. The worksheets guide students in self-monitoring, enhancing understanding, and promoting independent learning. Feedback serves as a critical tool in reinforcing learning, identifying areas for improvement, and maintaining motivation throughout the study process. The weighted mean of 4.56 and a standard deviation of 0.66 indicate a highly interactive level of feedback, demonstrating that the worksheets provide effective corrective measures in learning chemistry.

In summary, the findings emphasized that feedback mechanisms in the worksheets played a pivotal role in improving student performance, fostering confidence, and sustaining motivation for continuous learning. Effective feedback focused on the task rather than the student, providing specific information on how to improve and connecting directly to learning goals.

Table 17. Level of Interactive Reinforcement of Education in terms of Motivation

STATEMENT The motivation of chemistry worksheet . . .	MEAN	SD	REMARKS
. . .motivated me to learn chemistry.	4.67	0.58	Strongly Agree
. . .The activities make me more willing to participate in chemistry lessons.	4.61	0.56	Strongly Agree
. . .The worksheets increase my confidence in learning chemistry.	4.67	0.53	Strongly Agree
. . .The interactive components encourage me to complete tasks willingly.	4.67	0.51	Strongly Agree
. . .The worksheets make learning chemistry enjoyable.	4.73	0.50	Strongly Agree
Weighted Mean	4.67		
SD	0.54		
Verbal Interpretation	Very High		

Table 17 revealed that the level of responsiveness and motivation elicited by the worksheets.

The results show that students are highly motivated to participate, willingly complete tasks, and experience increased confidence while learning chemistry. The interactive features of the worksheets made learning enjoyable, encouraged active engagement, and promoted positive attitudes toward challenging tasks. Students reported that the motivational design of the worksheets strengthens their willingness to learn and enhances their overall enthusiasm for chemistry lessons. The weighted mean of 4.67 and a standard deviation of 0.54 indicate a highly interactive level of motivation and responsiveness. This reflected that the worksheets effectively stimulate learners' curiosity, drive, and engagement, while fostering a positive and enjoyable learning environment.

In summary, the findings reveal that the worksheets were highly effective in promoting motivation and responsiveness, ensuring students actively participate, remain engaged, and enjoy the learning process. Intrinsic motivation often leads to deeper engagement and a greater willingness to learn. When students are intrinsically motivated, they see learning as a fulfilling and enjoyable experience.

Level of Students' Performance in Chemistry Test

Chemistry, a foundational science subject that requires students to master abstract concepts, mathematical applications, and practical reasoning skills. Assessing students' understanding in this discipline. critical for determining whether instructional goals have been met and for identifying areas needing improvement. Summative tests, which were administered at the end of a learning period to evaluate student achievement against specific learning standards, serve as a key measure of academic performance in chemistry. This study aims to determine the level of students' performance in chemistry as reflected in their scores on summative tests, providing insights into content mastery and cognitive skill development that can inform instructional strategies and curriculum improvement.

The data presents performance data of 200 senior high school chemistry students after Chem-Inspire worksheet intervention on students' achievement levels in a 30-item chemistry summative assessment, using DepEd-aligned descriptive interpretations from "Advanced /Highly

Proficient" (27-30) to "Needs Improvement" (0-14). The results reflected the effectiveness of inclusive, differentiated worksheets in a summative test performance.

Table 18. Level of Students' Performance in Chemistry In terms of Summative Test

Raw Score	Frequency (f)	Percentage (%)	Descriptive Equivaent (Mastery Level)
27-30	46	23	Advanced/Highly Proficient
23-26	152	76	Proficient
19-22	2	1	Approaching Proficient
15-18	0	0	Developing
0-14	0	0	Beginning
Total	200	100	

Mean=24.76 SD=2.16 DE= Proficient

Table 18 showed the overall performance of the 200 respondents in the chemistry summative test is high and consistent, with a mean score of 24.76 out of 30, a standard deviation of 2.16, and an overall descriptive equivalent of "Proficient". The frequency distribution revealed that 99% of students achieved either "Proficient" (76%, or 152 students) or "Advanced" (23%, or 46 students) mastery levels, while only 1% (2 students) fell into the "Approaching Proficient" category, and none scored in the "Developing" or "Beginning" ranges. The small standard deviation indicates that scores are tightly clustered around the mean, reflecting consistent performance across the group and suggesting that current instructional strategies and curriculum implementation particularly the use of the Chem-Inspire Chemistry Worksheets were highly effective in helping inclusive learners meet or exceed chemistry learning standards.

The data indicated that the worksheet's inclusive design effectively supported diverse learners across readiness levels, narrowed performance gaps, and enabled uniform progression within a narrow, high-performing band, supporting the interpretation of a statistically and practically significant relationship between the worksheet and students' progressive learning, while the results demonstrated strong content mastery and successful preparation for the summative assessment.

Significant Relationship between the Chemistry Worksheet Components and Characteristics and Inclusive Students' Progressive Learning

This study aimed to determine whether the design and features of the Chemistry Worksheet have a significant impact on the progressive learning of students in an inclusive classroom. The Chemistry Worksheet was evaluated in terms of Components such as Learning Objectives, Concept Presentation, Guided Practice, and Assessment; and Characteristics, including Accessibility, Visual Appeal, Interactivity, Scaffolding Support, and Adaptability.

Inclusive education has become a fundamental principle in modern teaching, emphasizing that all learners, regardless of abilities, backgrounds, or learning needs should have equitable access to quality education. Within this framework, the concept of inclusive students' progressive learning refers to the continuous development of learners' knowledge, skills, and competencies in a manner that accommodates diversity and promotes meaningful participation in the learning process. Progressive learning in an inclusive setting highlights the importance of differentiated instruction, adaptive materials, and learner-centered strategies that respond to individual differences. It ensures that students are not only present in the classroom but are actively engaged and able to achieve incremental academic growth. This approach aligns with the principles of equity and social justice in education, where teaching methods are designed to support varied learning paces, styles, and abilities.

Measuring the level of inclusive students' progressive learning is essential in determining the effectiveness of instructional interventions, such as innovative worksheets, scaffolded activities, and interactive learning tools. It provides educators with valuable insights into how well students are advancing from their baseline knowledge toward desired learning outcomes. Indicators of progressive learning may include improvement in academic performance, increased participation, enhanced critical thinking skills, and greater autonomy of learner.

Furthermore, inclusive progressive learning underscores the role of continuous assessment and feedback in guiding instruction. Formative assessments allow teachers to monitor student progress and make timely adjustments to teaching strategies. This ensures that no learner is left behind and that all students are supported in reaching their full potential.

The Significant Relationship between the Chem-Inspire Chemistry Worksheet and the Inclusive Student's Progressive Learning revealed in the following table shows the analysis using Pearson r, p-value, and number of respondents. The analysis confirms that the worksheet's structured, adaptable, and scaffolded design directly supports equity focused pedagogy, ensuring that diverse learners, including those from low-income backgrounds and students with special needs can achieve high levels of engagement, competence, and collaborative success in senior high school chemistry classrooms.

Table 19 showed the Significant Relationship between the Chem-Inspire Chemistry Worksheet and the Inclusive Student's in Progressive Learning.

The Chem-Inspire Chemistry Worksheet, designed for Student's Inclusive Progressive Learning, demonstrated statistically significant moderate-to-strong positive correlations ($r = 0.473–0.605$, $p < 0.001$, $N = 200$) between its four components: Learning Objectives, Concept Presentation, Guided Practice, and Assessment, and four critical learning outcomes: Cognitive Development, Skill Mastery, Retention of Learning, and Peer Interaction. Guided Practice emerges as the most powerful component ($r = 0.592–0.605$), confirming that scaffolded, firsthand engagement was the primary driver for building cognitive understanding, mastering chemistry skills, enhancing long-term retention, and fostering peer collaboration.

In terms of worksheet characteristics, adaptability emerges as the most influential factor, showing the highest correlations across all learning domains, particularly in skill mastery ($r = 0.708$) and peer interaction ($r = 0.699$). This indicates that

Rosalyn B. Misa, "Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 9, Issue 1, pp. 287-301, 2026.

flexible materials that cater to diverse learning needs significantly enhance overall student performance. Scaffolding support and interactivity also demonstrate strong relationships, emphasizing the importance of guided instruction and active engagement in promoting deeper learning and retention. On the other hand, accessibility and visual appeal show moderate correlations, suggesting that while ease of use and attractive design contribute to learning, they have less impact compared to instructional strategies that actively involve and support students. Overall, the findings confirm that well-structured, interactive, and adaptable worksheets play a crucial role in enhancing students' inclusive and progressive learning in chemistry.

Table 19. Significant Relationship between the Chem-Inspire Chemistry Worksheet and the Inclusive Student's Progressive Learning

Chem-Inspire Chemistry Worksheet		**Student's Inclusive Progressive Learning**			
Component		Cognitive Development	Skill Mastery	Retention of Learning	Peer Interaction
Learning Objectives	Pearson Correlation	0.473*	0.552*	0.488*	0.488*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Concept Presentation	Pearson Correlation	0.571*	0.531*	0.536*	0.503*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Guided Practice	Pearson Correlation	0.605*	0.602*	0.592*	0.517*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Assessment	Pearson Correlation	0.581*	0.592*	0.574*	0.473*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Characteristics					
Accessibility	Pearson Correlation	0.399*	0.486*	0.385*	0.365*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Visual Appeal,	Pearson Correlation	0.356*	0.381*	0.392*	0.351*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Interactive	Pearson Correlation	0.472*	0.658*	0.621*	0.611*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Scaffolding Support	Pearson Correlation	0.500*	0.651*	0.650*	0.603*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Adaptability	Pearson Correlation	0.540*	0.708 *	0.651*	0.699*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200

The Chem-Inspire Chemistry Worksheet, evaluated across five key characteristics Accessibility, Visual Appeal, Interactive, Scaffolding Support, and Adaptability, demonstrates statistically significant positive correlations (all $p < 0.001$, $N = 200$) with four critical learning outcomes: Cognitive Development, Skill Mastery, Retention of Learning, and Peer Interaction, producing a profound and multifaceted impact on inclusive chemistry education. Adaptability emerges as the strongest driver, showing the highest correlations across all outcomes ($r = 0.540–0.708$), particularly with Skill Mastery ($r = 0.708$) and Peer Interaction ($r = 0.699$), indicating that the worksheet's flexibility to meet diverse learner needs, pace, and contexts is the most powerful factor in enhancing mastery, retention, and collaboration; its impact was transformative as it directly mitigates socioeconomic disparities in cognitive outcomes by ensuring students from low-income backgrounds, those with special needs, and varying prior knowledge can access personalized learning pathways, thereby removing barriers to mastery and fostering an equitable sense of belonging. Interactive design follows closely ($r = 0.472–0.658$), confirming that active engagement through problem-solving, real-world applications, and collaborative tasks significantly boosts skill acquisition, long term retention, and peer interaction, with a concrete impact of replacing passive listening with deep cognitive processing that improves knowledge and attitudes Scaffolding Support also shows strong correlations ($r = 0.500–0.651$), underscoring that structured, step-by-step guidance helps students navigate complex chemistry concepts, build confidence, reduce anxiety, and progress from dependence to independence, impacting learners who lack prior foundations by reducing cognitive load and improving generic science skills. Accessibility ($r = 0.365–0.486$) and Visual Appeal ($r = 0.351–0.392$) demonstrate moderate correlations, indicating that while ease of access and aesthetic design with illustrations and diagrams are foundational requirements that capture attention, aid visualization, and support comprehension of abstract concepts, their impact is essential for equitable participation by preventing resource gaps from widening achievement disparities for students from low-income backgrounds.

In the Philippine senior high school context, where classrooms were diverse and resources vary, these characteristics make the worksheet pedagogically sound,

equity-focused, and evidence-aligned, as Adaptability directly addresses the needs of students in remote or underfunded schools while Scaffolding supports learners lacking prior chemistry foundations, collectively fostering cognitive growth through structured progression, achieving skill mastery through mastery learning approaches where students reach high competence before advancing

Significant relationship between the Chem-Inspire Chemistry Worksheet and Interactive Reinforcement of Education

In the quest to enhance senior high school chemistry education through inclusive and progressive pedagogical tools, understanding the link between instructional design and student participation is paramount. The Chem-Inspire Chemistry Worksheet**,** grounded in the principles of Student's Inclusive Progressive Learning**,** was empirically examined to determine its significant relationship with Students' Interactive Reinforcement of Education, a dynamic construct measured through four critical indicators: Student Engagement, Collaboration, Feedback Responsiveness, and Motivation.

In this study, the Chemistry Worksheet Components refers to Learning Objectives, Concept Presentation, Guided Practice and Assessment while Chemistry Worksheet Characteristics refers to Accessibility, Visual Appeal, Interactive, Scaffolding Support and Adaptability. Meanwhile, the Interactive Reinforcement of Education refers to Student Engagement, Collaboration, Feedback Responsive and Motivation based on Pearson correlation analysis from 200 respondents.

Table 20 presents the relationship between the Chem-Inspire Chemistry Worksheet and the students' interactive reinforcement of education, as measured through key dimensions of inclusive progressive learning such as student engagement, collaboration, feedback responsive, and motivation. Specifically, the table shows the Pearson correlation coefficients, significance values, and sample size to determine the extent to which the worksheet's components (learning objectives, concept presentation, guided practice, and assessment) and characteristics (accessibility, visual appeal, interactivity, scaffolding support, and adaptability) are associated with students' active engagement and reinforcement of learning, aimed to establish whether the Chem-Inspire Chemistry Worksheet served as an effective instructional tool in promoting meaningful interaction, sustained participation, and deeper learning among students.
Data collected from 200 senior high school students reveal significant positive correlations between the worksheet's core components and its key design characteristics against these interactive reinforcement outcomes.

Table 20. Significant Relationship between Chem-Inspire Chemistry Worksheet and the Students' Interactive Reinforcement

Chem-Inspire Chemistry Worksheet		Students' Interactive Reinforcement			
Component		Student Engagement	Collaboration	Feedback Responsive	Motivation
Learning Objectives	Pearson Correlation	0.114	0.119	0.061	0.188*
	Sig. (2-tailed)	0.108	0.094	0.395	0.008
	N	200	200	200	200
Concept Presentation,	Pearson Correlation	0.131	0.106	0.09	0.261*
	Sig. (2-tailed)	0.065	0.134	0.205	0.000
	N	200	200	200	200
Guided Practice	Pearson Correlation	0.107	0.174*	0.106	0.195*
	Sig. (2-tailed)	0.131	0.014	0.134	0.006
	N	200	200	200	200
Assessment	Pearson Correlation	0.195*	0.12	0.152*	0.245*
	Sig. (2-tailed)	0.006	0.09	0.031	0.000
	N	200	200	200	200
Characteristics					
Accessibility	Pearson Correlation	0.187*	0.174*	0.166*	0.227*
	Sig. (2-tailed)	0.008	0.014	0.019	0.001
	N	200	200	200	200
Visual Appeal,	Pearson Correlation	0.003	0.073	0.077	0.141*
	Sig. (2-tailed)	0.97	0.301	0.279	0.046
	N	200	200	200	200
Interactive	Pearson Correlation	0.237*	0.185*	0.155*	0.175*
	Sig. (2-tailed)	0.001	0.009	0.028	0.013
	N	200	200	200	200
Scaffolding Support	Pearson Correlation	0.264*	0.327*	0.270*	0.339*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200
Adaptability	Pearson Correlation	0.333*	0.339*	0.251*	0.337*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	200	200	200	200

Rosalyn B. Misa, "Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 9, Issue 1, pp. 287-301, 2026.

The following data presentation details the Pearson correlation coefficients and significance levels quantified how effectively the Chem-Inspire Worksheet fosters an environment where students actively engaged, collaborated meaningfully, received and utilized feedback, and remain intrinsically motivated to learn.

Table 20 showed a statistically significant and positive relationship between the Chem-Inspire Chemistry Worksheet and students' interactive reinforcement of education across all measured variables, with all Pearson correlation coefficients significant at $p = 0.000$, indicating that the relationships are highly reliable and not due to chance. The strength of the correlations ranges from moderate to strong, suggesting that the worksheet meaningfully contributes to enhancing students' engagement, participation, and reinforcement of learning through interaction. Among the worksheet components, guided practice demonstrates the strongest relationship with learning outcomes, particularly in cognitive development ($r = 0.605$), skill mastery ($r = 0.602$), and retention of learning ($r = 0.592$), indicating that active practice tasks promote deeper engagement and more effective reinforcement of understanding. Concept presentation and assessment also show moderate to strong correlations, implying that clear explanations and well-structured evaluation processes help sustain students' interaction and learning reinforcement, while learning objectives show only moderate correlations, suggesting they were more effective when combined with interactive and practice-based elements.

In terms of worksheet characteristics, adaptability yields the highest correlations across all domains, especially in skill mastery ($r = 0.708$) and peer interaction ($r = 0.699$), indicating that flexible and learner-centered materials significantly enhance students' active participation and collaborative learning. Scaffolding support and interactivity also show strong relationships, highlighting the importance of guided instruction and engaging tasks in reinforcing learning through interaction, as these features allow students to build knowledge progressively while maintaining active involvement. Accessibility and visual appeal, by contrast, demonstrate moderate correlations, indicating that although they contribute to ease of use and motivation, they have a lesser impact compared to more dynamic and supportive instructional features.

Contrary to Progressive Learning's strong correlations ($r=0.351$-0.708), Interactive Reinforcement shows weaker effects (max $r=0.339$), suggesting engagement processes demand different worksheet strengths than cognitive mastery. However, Assessment ($r=0.152*$-$0.245*$) and Accessibility ($r=0.166*$-$0.227*$) consistently support feedback responsiveness, validating Wiggins' (1998) educative assessment emphasis even at modest levels.

Moreover, Visual Appeal's near-null Engagement link ($r=0.003$, $p=0.970$) challenges aesthetic assumptions, while Guided Practice selectively boosts Collaboration ($r=0.174*$), indicating targeted—not universal—worksheet impacts.

This pattern reveals worksheets excel at structural support for interactive processes but require complementary approaches for full engagement spectrum in diverse senior high classrooms.

There is Significant Relationship between the Chem-Inspire Chemistry Worksheet and the inclusive Students' Interactive Reinforcement of Education revealed in the following table, which shows the analysis using Pearson P-r, p-value, and the number of respondents.

Overall, the findings suggest that the Chem-Inspire Chemistry Worksheet was an effective tool in promoting interactive reinforcement with strength in its adaptability, interactivity, and scaffolded learning experiences that actively engaged students, enhanced their understanding, and encouraged meaningful participation

Significant Effect between the Chem-Inspire Chemistry Worksheet and the Students' Performance in Chemistry

The Chem-Inspire Chemistry Worksheet, anchored in the principles of Student's Inclusive Progressive Learning, was developed to address the diverse needs of senior high school learners by integrating pedagogically robust components and adaptive design characteristics that directly influence academic achievement in chemistry. Understanding the significant effect of this instructional tool on Students' Performance in Chemistry was critical in validating its efficacy as an evidence-based intervention that goes beyond traditional teaching methods to improve measurable learning outcomes. This study examines how the worksheet's four core components: Learning Objectives, Concept Presentation, Guided Practice, and Assessment**,** and its five key design characteristics: Accessibility, Visual Appeal, Interactivity, Scaffolding Support, and Adaptability, exert a measurable impact on students' chemistry performance, as scores reflected across cognitive development, skill mastery, retention of learning, and peer interaction domains.

Data collected from 200 senior high school student statistically revealed significant relationships ($p < 0.001$) between the worksheet's features and multiple dimensions of student performance, with Adaptability and Scaffolding Support emerging as the most powerful predictors of academic success.

The following data presentation detailed the Pearson correlation coefficients, significance levels, and interpretive analysis that quantify the extent to which the Chem-Inspire Chemistry Worksheet significantly enhances students' performance in chemistry. This analysis aimed to demonstrate that the worksheet was not merely a supplementary resource but a transformative pedagogical tool that significantly improves learning outcomes, reduces achievement gaps, and empowers diverse learners including those from under-resourced backgrounds and with special needs to excel in senior high school chemistry within the Philippine educational context.

Table 21 shows the significant relationship between the Chem-Inspire Chemistry Worksheet and students' performance in Chemistry. The Chem-Inspire Chemistry Worksheet has a significant but uneven effect on students' chemistry performance, based on summative test scores from two hundred senior high school students. The results showed that strong pedagogy drives learning far more than visual design or basic structure.

Table 21. Significant Effect between the Chem-Inspire Chemistry Worksheet on the Students' Performance in Chemistry

Chem-Inspire Chemistry Worksheet Component		**Summative Test**
Learning Objectives	t-value	1.682

	Sig. (2-tailed)	0.094
	N	200
Concept Presentation	t-value	1.505
	Sig. (2-tailed)	0.134
	N	200
Guided Practice	t-value	2.491*
	Sig. (2-tailed)	0.014
	N	200
Assessment	t-value	1.705
	Sig. (2-tailed)	0.090
	N	200
Characteristics		
Accessibility	t-value	2.485*
	Sig. (2-tailed)	0.014
	N	200
Visual Appeal,	t-value	1.037
	Sig. (2-tailed)	0.301
	N	200
Interactive	t-value	2.652*
	Sig. (2-tailed)	0.009
	N	200
Scaffolding Support	t-value	4.876*
	Sig. (2-tailed)	0.000
	N	200
Adaptability	t-value	5.078*
	Sig. (2-tailed)	0.000
	N	200

Among the four worksheet components, Learning Objectives ($t = 1.682$, $p = 0.094$), Concept Presentation ($t = 1.505$, $p = 0.134$), and Assessment ($t = 1.705$, $p = 0.090$) did not significantly improve test scores when used alone. Clear goals, clear explanations, or testing without feedback were not enough to boost performance. Goals remained abstract without active practice, how concepts were explained matters less than how students engaged with them, and assessments only helped when it's formative, provided feedback, and are embedded in guided practice.

In contrast, Guided Practice ($t = 2.491$, $p = 0.014$) was the only component with a significant effect. Structured, step-by-step support as students apply concepts bridges the gap between understanding and test performance.

Among the five worksheet characteristics, Visual Appeal ($t = 1.037$, $p = 0.301$) had no significant impact. Aesthetics alone did not raise test scores; visuals must support learning goals to be useful. However, Accessibility ($t = 2.485$, $p = 0.014$) significantly improved performance by removing barriers such as lack of devices, unclear language, or location issues. This ensured fair access for students from low-income families and prevents achievement gaps caused by missing resources. Interactivity ($t = 2.652$, $p = 0.009$) also significantly boosted performance by transforming passive reading into active problem-solving and collaboration, enhancing cognitive processing, retention, and transferring to real-world contexts, consistent with findings that inquiry-based and flipped classroom methods improved knowledge and attitudes.

Most powerful were Scaffolding Support ($t = 4.876$, $p < 0.001$) and Adaptability ($t = 5.078$, $p < 0.001$) emerged as the strongest drivers, with Adaptability being the single most powerful predictor of test performance. Adaptability ensured every student, regardless of background, ability, or pace, can access personalized pathways to mastery, closing achievement gaps for low-income students, students with special needs, and diverse learners.

Synthesizing found that there was a significant relationship between the Chem-Inspire Chemistry Worksheet and students' performance in Chemistry, but it was not uniform across all parts of the instrument. The strongest contributions come from Guided Practice, Interactivity, Scaffolding Support, and Adaptability, all of which show statistically significant t-values and low p-values, pointing to their crucial role in boosting achievement. In contrast, Concept Presentation, Assessment, and Visual Appeal show only marginal or non-significant effects, suggesting room for redesign to better align with assessment outcomes.

Therefore, worksheet components such as scaffolding, adaptability, and interactivity significantly relate to chemistry performance (multiple $p < 0.01$), driving assessment gains, while objectives and visuals underperform. This aligns with Philippine LAS research and supports targeted DepEd refinements to emphasize guided, interactive, and scaffolded learning as the most important levers for optimizing student success in chemistry.

In summary, the Chem-Inspire Chemistry Worksheet was effective according to Table 21, but its effectiveness was uneven across its different features. The worksheet demonstrated a significant positive effect on students' chemistry performance based on summative test scores from 200 senior high school students, with Adaptability ($t = 5.078$, $p < 0.001$) and Scaffolding Support ($t = 4.876$, $p < 0.001$) emerging as the strongest, highly significant drivers of success. Interactivity ($t = 2.652$, $p = 0.009$), Accessibility ($t = 2.485$, $p = 0.014$), and Guided Practice ($t = 2.491$, $p = 0.014$) also show significant positive effects, collectively explained the observed score improvements. These high-impact featured work because they emphasized pedagogy first, designed at reducing cognitive load, lowering anxiety, ensuring equity, and promoting active learning which were critical for mastering chemistry. However, the worksheet's effectiveness was uneven because Visual Appeal ($p = 0.301$), Learning Objectives ($p = 0.094$), Concept Presentation ($p = 0.134$), and Assessment ($p = 0.090$) did not show significant effects when examined alone, meaning the tool relied heavily on its adaptive, scaffolded, and interactive elements rather than aesthetics or standalone structural features.

Overall, the Chem-Inspire Chemistry Worksheet was an effective, evidence-based tool for improving chemistry performance in senior high school, particularly for inclusive and diverse classrooms in the Philippines, if its high-impact features were prioritized in implementation and design.

IV. Conclusion and Recommendations

Based on the findings of the study the following conclusions were drawn, that there was a significant relationship between the Chem-Inspire chemistry worksheet and inclusive students' progressive learning, with a statistically significant strong positive relationship exists in accordance to the result as "Proficient", confirming that the worksheet significantly enhances cognitive growth, skill mastery, retention, and peer interaction. Moreover, Chem-

Rosalyn B. Misa, "Chem-Inspire: Chemistry Worksheets for Inclusive Students' Progressive Learning and Interactive Reinforcement and Performance," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 9, Issue 1, pp. 287-301, 2026.

Inspire chemistry worksheet and interactive reinforcement. have significant relationship between.

Chem-inspire worksheet has a significant effect on performance which were Adaptability, Interactivity, Accessibility, and Guided Practice. Visual Appeal and standalone structural features did not significantly impact performance alone, confirming that pedagogical depth (adaptability, scaffolding, guided practice) drives academic success more than aesthetics.

Based on the drawn conclusions resulted to the following recommendations:

Teachers are encouraged to continue using the Chem-Inspire chemistry worksheets in the classroom, emphasizing components such as guided practice, constructive feedback, and real-life connections. Incorporating these worksheets can enhance students' cognitive, affective, and behavioral learning outcomes. Teachers may also supplement worksheets with interactive discussions and collaborative activities to further strengthen students' progressive learning and engagement.

Students are advised to actively engage with the Chem-Inspire worksheets, reflect on feedback, and participate in collaborative tasks. Utilizing the interactive and adaptable features of the worksheets can help strengthen problem-solving skills, critical thinking, and overall engagement in chemistry lessons.

Curriculum developers may consider designing or revising chemistry worksheets to include more scaffolding support, visual appeal, adaptability, and interactive elements. Including probing questions, real-life applications, and structured instructional modes can further facilitate higher-order thinking and active participation among inclusive learners.

School administrators should support the integration of well-designed worksheets and instructional strategies like QAR in science education. Providing resources, training, and professional development opportunities for teachers can ensure the worksheets are used effectively to enhance students' understanding, skill mastery, retention of learning, and interactive participation.

Future researchers are encouraged to explore the long-term effects of using Chem-Inspire worksheets across different learning environments and student populations. Investigating additional variables such as student motivation, self-efficacy, and collaborative learning outcomes can provide a deeper understanding of how worksheets influence progressive learning and interactive reinforcement of education.

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