UNVEILING LEARNING EXPERIENCES IN CHEMISTRY

Jiecel F. Garote[1], Susan S. Janer[2]

[1]Department of Education, Jaime G. Espeña High School, Sorsogon Province, Philippines
[2]Sorsogon State University Graduate School, Sorsogon City, Philippines

ABSTRACT

This study was set out to understand students' learning experiences in Chemistry. The focus of the research was to (1) describe the experiences of the Grade 8 students in learning chemistry concepts in terms of a) cognitive challenges, b) learners' engagement, c) classroom environment, d) teachers' practices, and e) learning resources, and (2) Propose a modified lesson exemplar aligned to the findings of the study. Descriptive qualitative research design was used, which is well-suited to exploring the lived experiences of individuals. Conducted at Jaime G. Espeña High School from 2024 to 2025, six Grade 8 students who performed low were carefully selected as participants. Data were gathered through individual interviews, where students were encouraged to speak openly about their struggles and breakthroughs in chemistry. Findings revealed that there are different factors that affect their learning process, such as prior knowledge, interest towards the subject, classroom environment including the teacher`s way of teaching, and availability of learning resources. Taken together, these findings point to a clear and urgent message for educators and school leaders: effective chemistry teaching is not just about covering the curriculum - it is about meeting students where they are, making the invisible visible, and building the kind of trust that encourages learners to keep trying even when the material feels overwhelming. The study recommends a deliberate shift toward contextualized, active, and inquiry-based instructional approaches, supported by richer and more accessible learning materials.

Keywords: *Learning experiences, Chemistry, qualitative research, modified learning exemplars*

1. INTRODUCTION

Science teaching cannot be disassociated from the contexts within which learning is enacted. Specifically, a set of ongoing global sociocultural influences contextually situate science teaching, influencing the teacher's role in science teaching, learners' learning processes, and the context in which education is enacted and situated (Ramos de Robles & Gallard Martínez, 2022) Last 2015, to provide a worldwide framework for sustainable development, the United Nation created the 17 Sustainable Development Goals (SDGs) and 1609 specific goals during its General Assembly in New York. SDG 4 specifically emphasizes the value of high-quality education and guarantees inclusive, egalitarian and lifelong learning opportunities to all regardless of the situation, background or status of life.

Based on the study of Talanquar et al. (2020), the COVID-19 pandemic has fundamentally changed many aspects of our world, including the way we teach chemistry. In order for meaningful learning to take place, three conditions must be satisfied: i) a student must have some relevant prior knowledge to which the new information can be related in a non-arbitrary manner, ii) the material to be learned must be meaningful in and of itself; that is, it must contain important concepts and propositions relatable to existing knowledge, and iii) a student must consciously choose to non-arbitrarily incorporate this meaningful material into his/her existing knowledge, a disposition which Ausubel labels as the meaningful learning set . (Bretz, 2001). How lessons connect the macroscopic (what they see), submicroscopic (particles) and symbolic (formulas) influences students` sense-making. (Permatasari et al. 2022)

Systematic reviews by Guerra-Reyes et al. (2024) show, core misconceptions regarding chemistry ideas should be looked at that potentially impact confidence and participation – precisely the "experience" Grade 7 students describe (e.g., atoms vs. molecules, bonding, symbols). Recent syntheses of inquiry-based chemistry education and studies on small-scale chemistry (SSC) show gains in engagement and accessibility—useful for interpreting students' reports that "hands-on, small, safe" activities make concepts clearer. (Jegstad, 2023).

Based on the study of Garingo and Cojucom (2022), they concluded that junior high school chemistry learners experienced three significant challenges: pedagogical, technological, and sociological challenges.

Last December 2023 Organization for Economic Co-operation and Development (OECD) released the 2022 PISA results, according to it 23% of students in the Philippines attained level 2 or higher in science (OECD average: 76%). At a minimum, these students can recognize the correct explanation for familiar scientific phenomena and can use such knowledge to identify, in simple cases, whether a conclusion is valid based on the data provided. In the Philippines, almost no student were top performers in science, meaning that they were proficient at Level 5 or 6 (OECD average: 7%). These students can creatively and autonomously apply their knowledge of and about science to a wide variety of situations including unfamiliar ones. According to the report published philstar global by Chi, 2024, Philippines rank in the bottom four among 64 countries. Filipino students` performance placed Philippines in the same range as Albania, Uzbekistan and Morocco. The mean score is 14 which is below the Organization for Economic Cooperation and Development (OECD) average of 33. Only 3% of Filipino students can match the creative thinking abilities of the average student in Singapore, who landed at the top five with an average of 41.

The Enhanced K-10 Curriculum formerly known as MATATAG Curriculum is the latest educational framework that will be followed in all the educational institutions of Philippines. The spiral progression approach in teaching science (Valin & Janer, 2019) still remains. The new curriculum aims to address these critical issues and bring meaningful improvements to the Philippine education system. Duldulao (2025) highlighted in her study that while most teachers possess strong teaching knowledge and skills, they require additional support in integrating cultural and contextual elements into their lessons. However, some gaps were noted in instructional planning support and access to teaching materials, which affected their overall preparedness. Amidst the challenges faced by the teachers as curriculum implementers, they remained steadfast in ensuring that every student from the grade 7 level upon implementing the MATATAG curriculum will be matatag, stay matatag, and always matatag. (Garma, 2024). As concluded by Abdurahman et al. (2022), teaching the learning contents in science in areas of Biology, Physical Science and Life and Space were found to be moderately difficult. Selecting the appropriate method in teaching science were alos found to be moderately difficult. Students grew their interest in learning science after being exposed to Inquiry - Base Learning (Sarsale et al., 2023). Mangubat (2023) concluded that the type of school where students are enrolled significantly correlates to student`s academic performance, particularly in chemistry.

Science education offers a dynamic journey of discovery, where curiosity transforms into understanding and questions lead to meaningful exploration. Through hands-on activities and experimentations, collaborative work and inquiry and critical thinking, students develop a deeper knowledge of the natural world and analytical thinking skills needed to navigate real-world challenges. Every lesson and topic becomes an opportunity to observe, learn, become curious, ask questions, create their own hypothesis, and reflect showing the very process that scientists use to expand the boundaries of human knowledge. By engaging with science in meaningful and relevant ways, students build a foundation that empowers them to become aware, informed, innovative, and thoughtful contributors to this constantly evolving world.

Based on what Harefa et al. (2021) discussed in their study, that increasing interest in learning in students will bring an increase in student learning outcomes and vice versa when learning interest is low; learning outcomes tend to be low. However, this study also highlights that there were respondents whose learning interest was low, but their learning outcomes were high. This is because of the lack of seriousness among the respondents. Interest has a great influence on learning. If the subject matter is not interesting for them, they tend to perform low.

Game-based learning experiences showed higher learning gains (Olim et al., 2024). Children can engage with chemistry content. Interest affects learning ability. (Surya & Arty, 2021). According to their study, student`s interest has a great impact in their performance and teacher`s role is very important in developing students' interest through student-oriented learning and connecting concepts with real life. Students also need to develop interest through increasing curiosity, creating a classroom atmosphere, and having a high willingness to attend chemistry learning.

The experiences of the students could be viewed in terms of social interaction, lesson

understanding, learning engagement, and course design and resources (Ramirez, H. J. M., 2024). The findings of the study of Dalgety & Coll (2005), students dislike learning lectures style; they enjoy tutorials. As concluded by Yao, J. (2023), experiential learning in secondary school chemistry education reveals its ability to actively engage students in knowledge construction through hands-on techniques.

This study is focused on two objectives:

1) describe the experiences of Grade 8 students in learning Chemistry concepts in terms of a) cognitive challenges, b) learners` engagement, c) classroom environment, d) teachers` practice, and e) learning resources and
2) propose a relevant output based on the findings of the study.

2. METHODS

A descriptive qualitative research design was used in this study. The respondents include six (6) Grade 8 students enrolled in Jaime G. Espeña High School during the school year 2025-2026 who gained the lowest grades in the first quarter grading period.

An interview guide was employed as the research instrument to collect first-hand information from the participants and allowed the researcher to have a follow up questions to further extract their experiences in Chemistry.

The data gathered were subjected to thematic analysis by Braun and Clarke`s to identify recurring patterns and themes that captured the essence of the students' learning experiences in chemistry.

3. RESULTS AND DISCUSSIONS

The learning experiences of grade 8 participants were assessed through individual interviews and classroom observation to further measure their past learnings in chemistry subjects. The following below shows the emerged themes from the thematic analysis conducted by the researcher. There are ten major themes that are identified, reflecting the learning experiences of each student from their previous learning experiences in learning chemistry concepts.

Table 1: Cognitive Challenges as Experienced by Grade 8 Students in Learning Chemistry

Theme	Description	Sample responses
Difficulty in understanding abstract concepts	Students find it difficult to understand chemistry concepts that are abstract and invisible to the naked eye.	*"Nalilimot ako, dire ko aram kun nano yun." - Makmak* *"Kay pano dire man sya naiimod, mapagal ipaliwanag nan masabutan" - Makmak* *"Pano dire man naiimod yun kaya dire ko masabutan san mayad, dire ko man siya naimagine kun nano yun, nasabutan ko kun naimod ko kun dire, wara na yun saako." - Patrick*
Difficulty in retaining and recalling discussed concepts	Students' poor prior knowledge makes it difficult to retain and memorize relevant topics or dicussions	*"nalilimot nan dire kaya na solo an activity" - Miko* *"dire man masakit, pero nalimotan ko" - Patrick* *"Pano daghanon na tuomon, dire ko man nabasa an iba, masakit mag compute san solute nan solvent, nalimot ako san formula nan kun pano kuhaon. An particle model dire man yun naiimod talaga, sa video ko siya nasabutan pero pag wara na sun, limot ko na kun nano yun." - Ryan*

Table 2: Learner`s Engagement as Experienced by Grade 8 Students in Learning Chemistry

Themes	Description	Sample responses
Active participation	Students` lack of focus and interest,	*"Nabudlay ako, kay dire ko man aram an leksyon, mapagal pa*

in class activities	and willingness to participate and learn	*basahon an iba." - John* *"Dire naka focus." "Dire ko man nasabutan, nan minsan gutom na ugang ako awaton pa mahuman an leksyon." - Makmak* *"Minsan lang nag intra." "Naraw`ay ako kanira, kay dire ko man aram minsan. Badi tinawahan nira ako." - Makmak* *"Mga maribukon pano sira, dire ko na lugod nababati, nabudlay na ako kay nakaingkod hak, kaya dire na ako nagbabati na. Minsan awaton, gutom na ako." - Patrick*
Motivation and interest in Chemistry	Students` intrinsic motivation and personal interest in chemistry significantly influence the quality and depth of their engagement with the subject.	*"Pano minsan pag nagbabati ako nakaaram, pag dire wara na. Kaya nalimot ako san iba." - Patrick* *"Masakit pano, kadaghanan kaipuhan adalan san mayad, napagal pa ako minsan nabasa an iba kay ibahon man an mga pangaran." - Patrick* *"Kay dire ako nagbabati nan absent ako" - Paolo* *"Nadara san ribok san kaklase ko." - John* *"Masakit mam, dire pa naiimod kaya dapat tuom mo, maluya ako dun." - Ryan*
Collaboration and peer interaction	Working and learning with peers is an important dimension of students' engagement.	*"Minsan, mas nakaaram ako kay indadanonan ako nira, kaso minsan mao man gihapon, depende sa activity na inhihimo namo." - Ryan* *"Mas nakasabot nan nag aayo danon sa kaklase" - Miko* *"minsan inpapadis ako sa maaram ko na kaklase para magtaas an score ko nan makasabot." - John*

Table 3: Classroom Environment as Experienced by Grade 8 Students in Learning Chemistry

Themes	**Description**	**Sample responses**
Physical learning conditions	Physical setup and condition of the classroom significantly affect the student`s comfort, focus and overall experience in chemistry.	*"Mga maribukon pano sira, dire ko na lugod nababati, nabudlay na ako kay nakaingkod hak mapasuon pa, kaya dire na ako nagbabati na." - Patrick* *"Maribukon an mga kaklase ko, nadara ako." - Paolo*
Emotional safety and classroom climate	The emotional atmosphere of the classroom, shaped largely by the teacher and dynamics among students, plays a critical role in how students experience chemistry learning	*"Minsan kay naraw`ay nan habo ako iintra san kaklase ko", "Makuliton kuno ako."* *- Miko* *"Inkakaistorya ako, tas intatagan himoon kaso dire ko man nahihimo kay may obrahon naman sa balay, minsan inpapadis ako sa maaram ko na kaklase para magtaas an score ko nan makasabot." - John* *"Minsan, mas nakaaram ako kay indadanonan ako nira" - Ryan* *"Siguro mam, kay minsan pag intutukduan ako ni mam o*

		san kaklase ko nakaaram ako." - Patrick ***"****Inkakaistorya kami, saru saru, tas inpapaimod an score tas inpapa obra saamo an iba na activity, kaso dire ko man nahihimo kay pag uli madanon na tas nalimutan ko na himoon kaya dire na ako nakapasa." - Makmak* *"Naghahatag activity ulit o inhahapot kami kun arin an dire nasabutan para uliton." - Paolo*

Table 4: Teachers` practice as Experienced by Grade 8 Students in Learning Chemistry

Theme	Description	Sample responses
Use of instructional strategies	The use of different teaching strategies such as demonstration, visual aids, hands-on activities, and real-life examples and translanguaging to make chemistry concepts more understandable and relatable to students.	*"Libro, may video man, tas manila paper nan gamit sa pag expirement." - Makmak* *"Microscope, LAS and Module, Videos, Pictures." - Ryan* *"Mas nakaaram ako kun may mga video nan kun inlilipat sa istorya natu an leksyon." - Miko* *"mas nakaaram ako kun inliliwat ni mam an istorya sa tagalog o bicol tas kun may kaupod na kaklase magsimbag" - Patrick*

Table 5: Learning Resources as Experienced by Grade 8 Students in Learning Chemistry

Themes	Description	Sample responses
Availability and adequacy of learning materials	The availability of textbooks, modules, laboratory equipment, and other instructional materials is a fundamental factor that shapes students` learning experiences in chemistry.	***"****Libro, may video man, tas manila paper nan gamit sa pag expirement." - Makmak* *"Inkukuha sa dati na module o LAS an inhihimo namo na activity.* *- Makmak* *"LAS, may video nan module" - Patrick* *"hali kuno sa deped, pero intutukalan ni mam minsan kun dire man nahahanap an video sadto na mga himoon." - Patrick*
Use of technology as a learning resource	The integration of technology such as computers, projectors, educational videos, and online platforms into chemistry instruction enhances students` access to diverse and dynamic	*"Microscope, LAS and Module, Videos, Pictures" - Ryan* *"Mas madali ko maaraman kay naiimod ko." - Ryan* *"Microscope, LAS and Module, Videos, Pictures" - Miko* *"hali kuno sa deped, pero intutukalan ni mam minsan kun dire man nahahanap an video sadto na mga*

	learning resources.	*himoon." - Patrick* *" An microscope, inpaimod nan inpagamit saamo, mga bote na saraday." - Makmak*

The findings below reveal that the learning experiences of these students are greatly affected by their attitude, their background, prior knowledge, learning materials used, and teachers' influence towards learning chemistry concepts.

The findings indicate that many students have trouble understanding lessons and retaining concepts, often forgetting previously discussed topics and on top of this, most of them are struggling readers. This suggests that students may have poor foundational knowledge and the ability to read and recognized words can hinder their learning process, and greatly affects their ability to understand new information. When lessons build on prior concepts that are not fully understood, cognitive overload may occur, leading to confusion and disengagement. These results support the study of Dong, et al, (2020), states that learning engagement is strongly influenced by prior knowledge. The findings highlight the need for diagnostic assessments and reinforcement activities to address learning gaps.

Results reveal that lack of focus, poor listening during discussions, and low willingness to participate are common challenges in the classroom. These behaviors may indicate low motivation or limited interest in the lesson content. Classroom disengagement can also be linked to teaching methods that do not match student`s learning preferences. As highlighted in the result of the study of Rone, Et, al. (2023), teacher-participants were concerned about the lack of motivation and engagement of the learners in the classroom. For student-participants had the mindset to play around the corner of the classroom rather than listen to the teachers` lesson. Further emphasize that teachers should come up with different strategies and methods that suit the learner`s level.

The data shows that classroom noise and chaos, absenteeism, and escapism negatively affect students` learning experiences. A disruptive environment limits students` ability to concentrate and process information effectively. Absenteeism further contributes to learning gaps, making it more difficult for students to follow ongoing lessons. As stated on the study of Parvathi, (2024), absenteeism not only impairs academic success but also contributes to behavioral challenges, reinforcing the need for effective intervention strategies to promote regular attendance and enhance overall student outcomes.

In addition to this, students' socio-economic background plays an important role in their learning journey, this could help or hinders the students entire learning experiences. Based on the students` answers, it revealed that most of them find it difficult to catch up with the lesson or activities, because they must help with the households' chores and help the family financially. Before the interview, the researchers ask the students/participants and their peers about the situation of their family background. Students are mostly from financially struggling families; they work for food every single day. Absenteeism among themes was also linked to this reason, that`s why they are behind with their lessons.

The findings highlight the significant role of teachers` strategies, scaffolding, and use of hands-on activities in supporting students' learning. When teachers provide structured guidance and interactive activities, students demonstrate better understanding and increased participation. As stated in the constructivist theory, Dewey rejected the notion that school should focus on repetitive, rote memorization and proposed a method of "direct living" – students would engage in real-world, practical workshops in which they would demonstrate their knowledge through creativity and collaboration. (Ward, P. 2025)

M.L.E = Modified Lesson Exemplars

Based on the findings gathered through in-depth interviews and classroom observations, the researcher recognized a pressing need to develop modified lesson exemplars as a practical and immediate response to the learning challengers identified among Grade 8 students in Chemistry. Under the Enhanced K-10 Curriculum, formerly known as MATATAG Curriculum, lesson exemplars serve as structured instructional guides that teachers follow during teaching procedures. However, the curriculum itself acknowledges that when the situation demands it, teachers have the professional discretion to modify the strategies, activities, and flow of the lesson to better serve their students` needs. As both a teacher and a researcher, this dual perspective offered a firsthand understanding of the realities that unfold inside the classroom - the struggle students silently carry, the gaps in comprehension that go unnoticed, and the quiet frustration of those who are left behind. It is from this place of genuine concern and professional responsibility that the decision to modify certain lesson procedures and learning activities was made, with the clear intention of addressing the needs of students who are struggling to keep pace with the lessons. One of the most meaningful adjustments identified involves the simplification of language and the use of locally familiar

terms and examples during discussions and activities. For many students, the barrier to understanding Chemistry is not the concept itself, but the complexity of the language used to explain it. By grounding abstract scientific ideas in contexts that students already know and relate to, comprehension becomes more accessible, learning becomes less intimidating, and students are given a genuine opportunity to engage with the subject matter rather than merely endure it.

Lesson exemplars are meant to be guides. Given the challenges found in this study, having a clear and flexible instructional guide is necessary. The researcher believes that this is one of the most practical and timely solutions that can be acted upon immediately. Learning gaps do not go away on their own. Without action, they only grow bigger and harder to address over time. Through this initiative, the researcher hopes to give struggling students the support and steppingstones they need to slowly build their understanding and confidence when it comes to learning chemistry concepts.

4. CONCLUSIONS

This study concludes that students` learning difficulties are influenced by multiple interrelated factors such as cognitive challenges, low engagement, classroom environment, learning materials to be used, and teacher or instructional practices. Many students have trouble understanding and retaining lesson concepts, which can be attributed to poor prior knowledge and limited focus and interest during discussions. Classroom noise, absenteeism, and lack of learning resources further hinder effective learning. However, the study also highlights that effective teaching strategies, scaffolding, and hands-on activities positively support student understanding and participation. Overall, improving classroom conditions and strengthening instructional practices are essential in enhancing students` learning experiences and academic achievement.

Teachers are encouraged to implement varied and interactive strategies such as hands-on activities and guided practice to enhance student engagement and understanding. Providing scaffolding and reviewing prerequisites concepts before introducing new lessons may help address students` learning difficulties.

School administrators may provide support by ensuring the availability of learning resources such as textbooks and instructional materials. They may also strengthen classroom management policies and implement programs that address absenteeism and escapism and promote regular attendance.

Students are encouraged to actively participate in class discussions, practice attentive listening, and seek clarification when lessons are unclear. Developing positive study habits may help improve focus and retention of concepts.

Parents or guardians may support student learning by monitoring attendance, encouraging regular study routines at home, and maintaining communication with teachers regarding their child`s academic progress.

For future researchers may explore additional factors affecting student learning, such as the use of technology-based instruction or differentiated learning approaches, to further enhance understanding of effective teaching and learning practices.

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