

Not in My Element: The Chemistry Subject Journey of Non- STEM BS Biology Students

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Abstract. Chemistry plays a vital role in addressing global challenges and advancing sustainable development through its contributions to agriculture, water treatment, renewable energy, healthcare, and technological innovation. It also equips learners with the knowledge and skills needed to understand and solve complex real-world problems. Despite its significance, many students from non-STEM backgrounds encounter significant challenges when transitioning into chemistry-intensive programs such as biology. Grounded in Edmund Husserl's descriptive phenomenology, this study explored the lived experiences of BS Biology students from non-STEM strands in learning chemistry. Seven (7) BS Biology students enrolled during the school year 2025–2026 and coming from non-STEM backgrounds (ABM, TVL, and GAS) were selected as the study's informants. An in-depth, semi-structured interview with open-ended questions was conducted face-to-face, recorded, and transcribed. For data analysis, Paul Colaizzi's method was utilized, wherein significant statements were extracted from the transcription, and formulated meanings were developed based on these statements. These were then used to identify one emergent theme, "Blooming Beyond the Habitat," which consists of the following seven subthemes: 1) Displaced Organisms; 2) Thorns of Complexity; 3) Wilted Petals of Doubt; 4) Roots of Survival; 5) Shared Sunlight; 6) Bloom Through Experience; and 7) Flowers After the Rain. The findings of the study revealed that despite lacking a STEM background, the informants experienced significant academic challenges in chemistry, particularly in understanding abstract concepts, complex terminologies, and problem-solving tasks. However, they gradually adapted through self-directed learning, peer collaboration, and experiential learning strategies. The study concluded that non-STEM BS Biology students can effectively cope and succeed in chemistry when supported by interactive instruction, collaborative learning, and experiential teaching strategies.

Introduction

Chemistry plays a fundamental role in addressing global challenges by providing knowledge and technologies for sustainable development, including agriculture, water purification, renewable energy, and medical advancements, while also driving innovation across various disciplines (Martinengo et al., 2025). Despite its significance, it is widely recognized as a difficult discipline due to its reliance on abstract concepts, symbolic representations, and complex problem-solving processes. Globally, the perceived difficulty of STEM programs discourages students from pursuing STEM-related fields, with only 21% of high school graduates adequately prepared for introductory coursework (Chestnut & Johnson, 2025). This lack of preparation hinders students' transition to college-level chemistry, as

many enter higher education without sufficient foundational knowledge, leading to academic adjustment challenges (Chen, 2013).

In the Philippine context, chemistry education is considered a significant academic challenge, particularly for students from non-STEM backgrounds. A meta-analytic review found that students' conceptual understanding, engagement, and academic development are influenced by instructional approaches, prior preparation, and learning environments (Vega, 2024). Local studies also show that students struggle with the abstract and mathematical nature of chemistry, which affects their confidence and overall performance (Paraguas, 2025), which are more pronounced among non-STEM learners. Further, students' perception of chemistry's relevance to their academic and professional goals significantly influences their engagement and performance (Ramirez & Paderna, 2025).

Many students who are not primarily STEM-focused experience significant difficulties in learning chemistry, which affects their engagement, confidence, and academic performance. Studies show that non-STEM learners entering science-related programs often struggle with abstract concepts, unfamiliar terminology, laboratory activities, and gaps in foundational knowledge, creating what researchers describe as a "chemistry gap" (Ortencio et al., 2025). Although previous research has examined teaching strategies, academic preparedness, and coping mechanisms among science students, limited qualitative studies specifically explore the lived experiences of non-STEM BS Biology students in chemistry subjects. Existing literature also lacks an in-depth phenomenological understanding of how these students interpret and navigate challenges related to lessons, laboratory requirements, and teacher expectations. To address this gap, the present study uses a phenomenological design to better understand how non-STEM BS Biology students perceive and cope with their chemistry learning experiences. The findings of this study may help inform interventions and support systems for non-STEM learners in science-related courses.

The researchers aimed to delve deeper into the experiences of non-STEM BS Biology students regarding their chemistry learning and their academic lives in general. They observed students struggling—hesitant in labs, puzzled by abstract concepts, and lacking confidence—often relying on quick coping strategies rather than deep understanding. Troubled by these lived classroom moments and the scarcity of local, firsthand accounts, the researchers chose the qualitative approach known as phenomenology, believing it essential to explore these students' lived experiences. Their goal was to listen closely to students' voices to uncover how they perceive and navigate academic and laboratory challenges, which coping practices they adopt, and what personal strengths or supports help them persist. Its findings will benefit not only chemistry instructors but also educational institutions striving to improve science education and produce more competent, confident graduates.

Methodology

Research Design

This study utilized a descriptive phenomenological research design to describe the lived experiences of non-STEM BS Biology students in their chemistry subjects. Descriptive phenomenology, rooted in the philosophy of Edmund Husserl, focuses on describing individuals' lived experiences as they are consciously experienced while setting aside the researchers' preconceived assumptions through bracketing. This design was appropriate because the study aimed to describe the challenges, adjustments, coping strategies, and realizations of non-STEM BS Biology students in learning chemistry. Semi-structured interviews were conducted to gather rich and detailed accounts of the informants' experiences. The collected data were analyzed using Colaizzi's Method of Data Analysis to identify significant statements, formulate meanings, cluster themes, and develop a description of the phenomenon. Throughout the study, the researchers practiced bracketing and maintained reflexive awareness to minimize bias and remain faithful to the lived experiences shared by the informants.

Research Informants

The informants of the study were purposively selected non-STEM BS Biology students from a private university in Negros Oriental, Philippines, who had taken or were currently taking chemistry subjects. Purposive sampling was employed to select informants who possessed direct experience with the phenomenon under investigation, ensuring rich and relevant descriptions of their lived experiences. The inclusion criteria required that the informants were currently enrolled in the BS Biology program, graduated from a non-STEM strand in senior high school, and had taken or were taking at least one chemistry subject. Seven (7) informants

participated in the study. Data saturation was achieved at the seventh informant, wherein no new significant statements, meanings, or themes emerged from the interviews. To ensure the credibility and completeness of the gathered data, the researchers interviewed one additional informant to confirm that no new information surfaced. Since the responses of the additional informant only reinforced the previously identified meanings and themes, the researchers concluded that data saturation had been fully attained.

Research Instrument

The study used a semi-structured, face-to-face interview as the primary data-collection instrument. The interview guide contained open-ended and follow-up questions that encouraged informants to provide detailed descriptions of their experiences as non-STEM BS Biology students in chemistry. This format let researchers use prepared prompts while probing for clarification or elaboration as needed. Guided by descriptive phenomenology, questions addressed participants' experiences, feelings, challenges, coping strategies, and realizations about learning chemistry. Interviews were audio-recorded with consent and supplemented by notes for accurate documentation.

Data Gathering Procedure

Data gathering commenced after securing permission from the Dean of the College of Arts and Sciences and obtaining ethical clearance from the Foundation University Office of Research and Development. Potential informants who met the inclusion criteria were identified through purposive sampling and were individually invited to participate in the study. Before the interview, the researchers explained the purpose of the study, confidentiality measures, and the informants' right to withdraw before securing informed consent. Semi-structured interviews were then conducted, lasting approximately 20 minutes depending on the informants' willingness to share their experiences. With the informants' consent, interviews were audio-recorded and supplemented with note-taking for accurate documentation. The collected responses were transcribed verbatim for analysis.

Data Analysis Procedure

The researchers analyzed the data using Paul Colaizzi's Seven-Step Method of Data Analysis, which is commonly used in descriptive phenomenological studies to systematically describe lived experiences. First, the researchers familiarized themselves with the data by reading and rereading the interview transcripts to gain a comprehensive understanding of the informants' experiences. Second, significant statements directly related to the phenomenon were extracted from the transcripts. Third, formulated meanings were developed from these significant statements while remaining faithful to the informants' descriptions. Fourth, the formulated meanings were organized into clusters of themes to identify common patterns and shared experiences among the informants. Fifth, the researchers developed an exhaustive description of the phenomenon by integrating all the emergent themes into a detailed narrative. Sixth, the fundamental structure of the phenomenon was formulated to capture the essence of the informants' lived experiences in chemistry subjects. Finally, member checking was conducted by returning the findings to the informants for validation to ensure that the descriptions accurately reflected their experiences. Through this systematic process, the researchers were able to identify the emergent theme and subthemes that described the lived experiences of non-STEM BS Biology students in learning chemistry.

Ethical Consideration

The researchers ensured that all informants and their responses were treated with strict confidentiality and anonymity. Before conducting the study, the researchers acquired ethical clearance from the Foundation University Office of Research and Development to ensure that the study complied with institutional ethical standards and research guidelines. Prior to the interview, informants were informed about the purpose and procedures of the study, and participation was entirely voluntary, with the right to withdraw at any stage of the research process. Informants were given sufficient time and freedom to share their experiences without interruption, and all information collected was used solely for academic purposes, with their rights, dignity,

and privacy protected throughout the study. After data collection, informants were given three (3) weeks to review their responses and were allowed to withdraw their participation within that period without consequences; after this duration, withdrawal was no longer permitted. Furthermore, the researchers utilized Artificial Intelligence (AI)-assisted tools solely to support the organization, refinement, and improvement of the research manuscript. However, AI tools were not used in the actual data collection, interview process or data analysis of informants' lived experiences to ensure the authenticity, credibility, and integrity of the study

Results and Discussion

Following a detailed analysis of the transcripts, alongside the significant statements and formulated meanings, the researchers successfully identified an emerging theme that captures the non-STEM BS-Biology students' chemistry subjects experience, highlighting the different factors that influences their journey in those subjects.

Emergent Theme: Blooming Beyond the Habitat

The emergent theme, Blooming Beyond the Habitat, captures the lived experiences of BS Biology students from non-STEM backgrounds as they navigate the challenges of learning chemistry. After conducting in-depth interviews, the researchers identified that informants described difficulties in adjusting due to limited foundational knowledge, often feeling overwhelmed and left behind, especially in topics requiring mathematical and analytical skills. Despite these struggles, they demonstrated resilience by developing coping strategies such as self-study, use of online resources, peer collaboration, and adapting to different teaching approaches. Support from classmates and teachers, along with hands-on laboratory activities, further helped them manage academic and emotional challenges. Although some experienced stress, self-doubt, and thoughts of shifting courses, these difficulties ultimately led to personal growth, discipline, and a deeper appreciation of chemistry's relevance in biology and everyday life.

Under this emergent theme are seven sub-themes, namely: a) Displaced Organisms; b) Thorns of Complexity; c) Wilted Petals of Doubt; d) Roots of Survival; e) Shared Sunlight; f) Bloom Through Experience; and g) Flowers after the Rain.

Theme 1: Displaced Organisms

Table 1 shows the first subtheme, Displaced Organisms, which presents the informants' lived experiences as non-STEM students adjusting to chemistry without prior academic background.

Subject Probed	Core Ideas	Code	Essential Theme
Non-STEM BS Biology students' lived experiences in adjusting to chemistry without prior STEM background	• Lack of prior chemistry knowledge • Difficulty adjusting • Feeling left behind	• Foundational deficit • Adjustment strain • Academic disadvantage • Transition gap	• Displaced Organisms

Table 1. Lived experiences of non-STEM biology students in adjusting to chemistry without prior STEM background

This theme illustrates the informants' challenges with the cognitive and intellectual pressure of chemistry. Many informants characterized chemistry as daunting because of its abstract ideas, strange vocabulary, mathematical challenges, and the need for critical thinking skills. Informants frequently linked chemistry to acquiring a new language due to its intricate symbols, formulas, structures, and specialized terminology. Disciplines like Organic Chemistry, Analytical Chemistry, and Biochemistry were frequently recognized as the most difficult. For instance, one informant mentioned that chemistry seemed alien and hard to grasp due to the unfamiliar terminology and ideas.

(Lisud siya compare sa STEM students, kay dali ra kaayo sa ilaha kay like naa naman silay... advanced chemistry, so ikaw nga nag GAS ka, behind jud ka pero dili totally behind kay sa GAS naa pud Science but dili lang pud totally in depth.) It is difficult to compare with STEM students because it is very easy for them since they already have advanced chemistry, so as someone who took GAS, you are really behind, but not completely behind because in GAS there is also Science, but it is not really in depth (14).

Transitioning from a non-science, high school background directly into heavy hitters like pharmacy and then biology felt like being thrown into the deep end of a pool without knowing how to swim (15).

(*Sa among TVL before, mostly handson ra among activities, dili siya related sa among classes karon mao na lisod kaayo ang adjustment.*) In our TVL before, most of our activities were only hands-on, and they were not related to our classes now, that is why the adjustment was very difficult (I3).

(*So katong pag enter nako diri as a Non-stem kay lisod siya I adjust kay lahi man gud ang field nga gikuha nako sa Senior High, then diri sa pagkuha nako sa field sa Science kay since ang biology kay wide man siya ug field sa mga perspective niya dapat kabalo pud ka mo, dapat makabalo ka sa fast pace kay general man gud akong gi sudlan so pag sulod nako aning sa chemistry wala kaaugoy background...*) So when I entered here as a non-STEM student, it was hard to adjust because the field I took in Senior High is different, then here in taking Science because Biology is a wide field in terms of its perspectives, you also need to know how to keep up with the fast pace since I am in a general strand, so when I entered chemistry I did not really have much background... (I2).

Being a non-STEM student and taking this course is actually very hard, especially It's like learning a new language (I7).

(*Akoang journey as a Biology student na graduate ug ABM I could not say na its really hard,di pud ko kaingon na sayon, I could say na its moderate lang.*) My journey as a Biology student who graduated from ABM, I cannot say that it is really hard, and I also cannot say that it is easy; I can say that it is just moderate (I1).

These statements affirm the importance of prior knowledge in facilitating learning and academic adjustments. These findings aligns with national trends observed in other Philippine universities, where non-STEM students consistently report a severe "transition gap" due to college curricula that implicitly assume prior STEM competencies (Vega, 2024). Furthermore, this phenomenon is not unique to the Philippines since international researches reveal a remarkably similar pattern. Shelton et al. (2023), highlighted that students with stronger academic backgrounds in science tend to perform better and adjust more easily in general chemistry courses across Western educational contexts as well. Similarly, Jere and Mpeta (2024), emphasized that prior knowledge and students' attitudes toward chemistry significantly influence academic achievement and understanding of chemistry concepts globally, underscoring that the academic disadvantages faced by non-traditional science students represent a universal educational challenge rather than a localized issue.

Theme 2: Thorns of Complexity

Table 2 displays the second subtheme, Thorns of Complexity, which presents the informants' lived experiences as non-STEM students dealing with the cognitive demands and complexities of learning chemistry.

Subject Probed	Core Ideas	Code	Essential Theme
Non-STEM BS Biology students' lived experiences in coping with the cognitive complexity of chemistry concepts and problem-solving tasks	• Abstract concepts • Math struggles • Terminology Overload • Complex subjects • Critical thinking demand • Math struggles	• Cognitive overload • Math anxiety • Language barrier • Conceptual difficulty	• Thorns of Complexity

Table 2. Lived experiences of non-STEM biology students in coping with cognitive demands in Chemistry

This theme illustrates emotional and psychological challenges faced by the informants. Informants described chemistry as mentally exhausting and daunting because it required understanding abstract concepts, memorizing unfamiliar terminologies, solving mathematical problems, and applying critical thinking simultaneously. One informant explained that chemistry felt completely foreign and difficult to comprehend because of the unfamiliar terms and concepts.

(*Sa analytical chemistry which is really into mathematics, I really had a hard time learning it kay di jud ko fan ug mathematics.*) In analytical chemistry which is really into mathematics, I really had a hard time learning it because I am not a fan of mathematics (I1).

When I first sat in my chemistry classes, I felt like everyone else had a secret manual that I wasn't given. I struggled with the language of chemistry, symbols, the logic of the periodic table, and those complex mathematical conversations (I5).

(ako kay akong utok ato kay kana ganing ga lutaw kay wala ko kabalo unsaon ni pag balance, then mao to kay kani mga chem kay murag balancing man gud siya ug equation so if dili ka kabalo sayop pud imong answer tanan.) My mind at that time was like floating because I did not know how to balance, and that's because chemistry is about balancing equations, so if you do not know how to balance, all of your answers will also be wrong (12).

(Ako maglisod jud ko ug sabot sa mga question kay lisod jud kaayo siya dili nako kuan ma hunahuanaan daoyon unsa dapat i answer.) I really have difficulty understanding the questions because they are really very difficult, and I cannot immediately think of what I should answer (11).

(First is maka overwhelm ang mga terms especially like sa Organic Chemistry class kay like it's running of periodic table lang and sighting it on, tas ikaw ang nahibalag nimo ng Periodic table sa Junior High lang...) First, the terms can be overwhelming especially in Organic Chemistry class because it feels like just a run-through of the periodic table and recognizing it, while for you, you only encountered the periodic table in Junior High (17).

(Murag morning to nga classes namo... una palang kay murag wala naka kasabot unsa ang kuan sa Biochemistry kay imo man gud siya tun-an tanang pathway, metabolic pathway gikan sa glycolysis, glocogynesis, kana tun an na siya nimo...) It was like our morning classes... right from the start, I already couldn't understand Biochemistry because you really have to study all the pathways, metabolic pathways from glycolysis to gluconeogenesis, you need to study everything... (12).

The informants' statements are supported by several studies emphasizing the cognitive complexity and learning difficulties experienced by students in chemistry. Stroumpouli and Tsaparlis (2022), highlighted that students experience conceptual and problem-solving difficulties in chemistry due to the subject's heavy demand for analytical and critical thinking skills. Similarly, Hamnell-Pamment (2023), found that scientific language and terminology significantly affect students' understanding and sensemaking in science learning.

Theme 3: Wilted Petals of Doubt

Table 3 reveals the third subtheme, Wilted Petals of Doubt, which reflects the informants' emotional experiences in learning chemistry. This theme captures how feelings such as anxiety, frustration, pressure, and self-doubt influenced their engagement and persistence in the subject.

Subject Probed	Core Ideas	Code	Essential Theme
Non-STEM BS Biology students' lived experiences in their chemistry subjects in terms of emotional experience	- Emotional distress - Academic pressure - Self-doubt - Loss of motivation	- Emotional struggle - Academic anxiety - Low self-confidence	Wilted Petals of Doubt

Table 3. Lived experiences of non-STEM biology students in terms of emotional responses in learning chemistry

This theme suggest that emotional turbulence is a key part of their lived experiences in learning chemistry, shaped by academic difficulty, adjustment challenges, and limited confidence due to their non-STEM background. They commonly experience pressure, anxiety, and discouragement, especially during exams and complex lessons where they feel overwhelmed and uncertain of their answers. These struggles are further intensified by comparisons with more prepared peers, leading to self-doubt, reduced confidence, and questioning of their academic fit. At times, repeated difficulties in problem-solving result in emotional breakdowns, while moments of success bring relief and a sense of accomplishment, showing a shifting emotional experience between struggle and satisfaction.

(Then everytime nga naay mga class kay mura rag galutaw akong utok usually kay hate man jud nako ang chemistry. Hate nga kay lisod siya, bisan unsaon nimog sabot, pero wala ko kabalo unsay laing huna-huna sa laing tawo.) Then every time there were classes, my mind would feel like it was floating because I really hate Chemistry. I hate it because it is difficult, no matter how much you try to understand it, but I do not know what other people think about it. (12).

(Dependa rapud siya sa instructor jud kay there are instructor nga lisod kaayo mo pasabot and kinahanglan nimo maningkamot ug Imoha, there instructor pud nga mga isog. Lisod pa ang subject dayon mag deal paka sa mga in ana nga instructor so maka drain gyud siya.) It really depends on the instructor because there are instructors who are very hard to understand and you need to try on your own. There are also instructors who are strict. When the subject is already difficult and you still have to deal with that kind of instructor, it becomes really draining (17).

(Kay naa man guy uban na ano lang discussion ra unya exam unya palantaw rag youtube. Kay kung puro ragud memorization unya ug complicated and explanation mawad-an gud ug interest and mga students, labi na sa mga students na pariha nako.) There are some who only do discussions, then exams, and just make us watch YouTube. Because if it is all memorization and the explanations are complicated, the students lose interest, especially students like me (11).

I compared myself to my classmates. You know, who seemed to solve everything so fast? Like it was second nature to them. That night, you know, what happened? I actually cried. Not just because of the problem but because I felt left behind (15).

(There are a lot of times nga maka question raka na sakto bani nga field imong gi sudlan, but if malampasan ra nimo siya maka ingon ra pud ka nga “ay sakto ra, okay ra ni” Basta malampasan ra jud, especially naay mga time nga mahagbong, and lisud pajud kaayu i-understand ang subject, ang lesson ninyu, maka wala jud siya og gana sometimes.) There are a lot of times when you question if this is really the right field you entered, but once you overcome it, you can also say, “ah, this is actually okay.” As long as you get through it, especially during times when you fail and the subject and lessons are very difficult to understand, it can really make you lose motivation sometimes (17).

(Pero paghuman sa laboratory kanang sa lab papers, wala napud ka kabalo unsaon, like kanang malingaw raka sa part nga mag lab pero pag-abot sa paper works wala naka kabalo unsa imong i answer) But after the laboratory, especially with the lab papers, you no longer know what to do, like you only enjoy the part where you do the lab, but when it comes to the paperwork, you no longer know what you are going to answer (12).

The informants' statements are supported by several studies highlighting the strong influence of emotions on students' learning experiences in chemistry. Damayanti and Wulanningtyas (2025), found that anxiety significantly influences students' motivation and understanding of chemistry, especially among learners with limited background knowledge. In addition, Brown and Nedungadi (2024), reported that both positive and negative emotions directly affect students' engagement and academic performance in chemistry, while Lagasca et al. (2025), highlighted that higher anxiety levels are associated with lower confidence and reduced interest in learning chemistry.

Theme 4: Roots of Survival

Table 4 presents the fourth subtheme, Roots of Survival, which highlights how non-STEM BS Biology students adapted to the challenges of chemistry subjects. Due to limited chemistry background, informants struggled with calculations, terminologies, laboratory activities, and complex lessons. To cope, they used strategies such as self-directed learning, repetitive studying, note-taking, peer collaboration, and online resources like YouTube and Google. Persistence, discipline, and continuous studying helped them gradually build resilience, confidence, and stronger academic habits despite repeated struggles.

Subject Probed	Core Ideas	Code	Essential Theme
Lived experiences of non-STEM BS Biology students in adapting to chemistry learning	• Use of YouTube tutorials • Repetition and selfreview • Collaborative learning • Disciplined study habits • Technology usage	• Self-directed learning • Peer support • Academic Resilience • Academic Adjustment	• Roots of Survival

Table 4. Lived experiences of non-STEM biology students in terms of strategic learning adaption in learning chemistry

This theme highlights the informants' coping mechanisms and adaptive learning strategies in understanding chemistry. Despite their struggles, many became resourceful and independent learners through self-study, online resources, repeated studying, note-taking, and problem-solving practice. Informants also emphasized discipline, consistency, and personal initiative, while others used strategies such as analogies, trial-and-error learning, and repetitive practice to gradually improve their understanding of chemistry.

(Ang akong cope mag lantaw ug YouTube, Youtube university. Like other ways kuan coping mechanism para ma kat-on? Kuan, mag youtube, kay other thing pud I'm not really into reading kay kapuyan kayo ko, ganahan ko mag read pero dapat naay visuals. Dapat naay kuan ba kay maglisod ko ug kat-on ug wala kaayo visuals unya ug anhi kos youtube maminaw kos YouTube.) My coping mechanism is watching YouTube, like YouTube University. I also use other coping strategies to learn. I watch YouTube because I'm not really into reading; I get tired easily. I like reading, but it should have visuals. I struggle to learn when there are no visuals, and when I go to YouTube, I listen and learn from it (I1).

(Ang GAS students, wala man jud na silay alimuhag ana, so search, search, search until makabalo ug maka-keep ka nila. Actually, in my experience that I used to be GAS student. Sa first year pako, dli man ko maka igon nga totally behind kayko because I know basic science, pero pag abot jud sa chemistry, didto nako nag search, search.) GAS students really do not have much knowledge about that, so it's all search, search, search until you learn and can keep up with them. Actually, based on my experience as a former GAS student, during my first year I cannot say that I was totally behind because I know basic science, but when it came to chemistry, that was when I really had to keep searching and searching (I4).

(If di ka kasabot maka search raman kas internet, sa YouTube para maka selfstudy ka.) If you do not understand the lesson, you can search on the internet or YouTube so you can study on your own. (I6)

(Naa man koy mga classmates na mo tabang sad nako ug tinabangay rapud mi.) I have classmates who help me, and we help each other. (I1)

I had to spend my nights watching vlogs, science, and tutorials just to understand the basics that my STEM classmates already knew by heart. (I5).

(Studying methods kay I always wirte gyud siya, kay usually man gud , ang uban man gud teachers always na sila magpakita ug PPT slides niya dili mana sila mag ingon nimo pag take notes mo.) My studying method is that I always write things down because usually, some teachers just show PowerPoint slides and they don't really tell you to take notes (I2).

The informants' statements reveal that adaptation became essential for non-STEM BS Biology students in chemistry subjects. Many relied on self-directed learning and online resources to cope with their limited chemistry background, supporting the findings of Vega (2024), regarding independent learning, academic adjustment, and engagement in chemistry. The findings also highlight the importance of collaborative learning and peer support. Informants shared that teamwork, peer tutoring, and group studying helped improve understanding and lessen stress (Ortencio et al., 2025). In addition, chemistry challenges helped students develop discipline, perseverance, and responsibility, supporting the study of Paraguas (2025) on persistence, self-efficacy, and personal growth through academic struggles.

Theme 5: Shared Sunlight

Table 5 represents the fifth subtheme, Shared Sunlight, which reflects the informants' experiences regarding the influence of peer interaction, teacher support, and collaborative learning in their chemistry subjects.

Subject Probed	Core Ideas	Code	Essential Theme
Non-STEM BS Biology students' lived experiences in receiving peer and teacher support while learning chemistry	• Difficulty adjusting • Teacher encouragement • Teacher approachability • Collaborative learning	• Peer support • Teacher support • Social interaction • Academic motivation	• Shared Sunlight

Table 5. Lived experiences of non-STEM biology students in terms of social and instructional support in learning chemistry

This theme captures the importance of social support and collaborative relationships in helping informants cope with chemistry. The informants emphasized that classmates, friends, and supportive teachers played a major role in reducing their stress, improving their understanding, and motivating them to continue despite academic struggles. Many informants shared that learning chemistry became easier when they studied together, exchanged explanations, and helped one another. For some, peer support became a source of encouragement whenever they felt discouraged from keeping up with the subject.

(Mas nice man gud og mag tinabangay mo padulong sa taas tanan, kay if you take it as a competition kay mag laglaganay naman gud mo ana and bati kaayu nang ing-ana jud, mas better gyud if mag tinabanganay mo always.) It is much better when you help each other succeed because if you treat it as a competition, you will just end up pulling each other down, and that kind of situation is really bad. It is really better if you always help one another (17).

(If mo open ka sa imoong teachers, ilang i-change ilang pamaagi para makuha nila ang unsay gipangita sa students.) If you open up to the teachers, they will change their methods to cater what the students need (12).

(Di jud ko ganahan, pero kuan kanang, sa akoang kinabuhi na ga kat-on ug chemistry, waman nuon ko ga lisod ug kuan kanang mag tuon kay naa man koy mga classmates na mo tabang sad nako. Unya, tinabanganay rapud mi, unya sa exam kay ano lang ug unsay nakat-onan mao rapud i-apply.) I don't really like it, but in my life learning chemistry, I don't really have a hard time studying because I have classmates who also help me. We help each other, and during exams, we just apply whatever we have learned (11).

Pure teaching is the strongest system we have. Sometimes a classmate can explain a concept and a student can talk better than a professor can in academic talk (15)

(Chill ra among maestro sauna nga mura ug friend namo. Okay ra amo experience niya unlike sa uban nga ma stress jud ka.) Our teacher before was chill, like he was our friend. Our experience with him was okay, unlike others where you would really get stressed (16).

These statements show that for the informants who didn't take STEM in high school, passing chemistry isn't just about studying hard on their own, it is about the people around them. The importance of help from friends and teachers in this study matches the findings of Eberlein et al. (2008), they found that when students study together, they explain things in "student language" that is much easier to understand than a professor's lecture. This "peer talk" acts like a safety net for students who feel behind. Additionally, the idea that a teacher should be easy to talk to was mentioned by one of our informants and is supported by Uzuntiryaki-Kondakci and Senay (2015), Their research shows that when teachers are supportive and willing to change and less afraid of failing, students learn more. By being flexible, these teachers help close the gap of non-STEM students, turning a scary subject into one they can actually handle.

Theme 6: Bloom Through Experience

Table 6 shows the sixth subtheme, Bloom Through Experience, which presents the informants' experiences regarding hands-on activities, laboratory work, and interactive teaching approaches in learning chemistry.

Subject Probed	Core Ideas	Code	Essential Theme
Non-STEM BS Biology students' lived experiences in learning chemistry through handson and experiential activities	• Hands-on experiments • Laboratory activities • Visual aids • Real-life applications • Interactive learning	• Experiential learning • Active learning • Visual learning • Practical application	• Bloom Through Experience

Table 6. Lived experiences of non-STEM Biology students in terms of experiential and interactive learning in chemistry

This theme indicates the informants' inclination towards experiential, visual, and engaging learning experiences in chemistry. Numerous informants found chemistry easier to understand and more enjoyable through laboratory experiments, demonstrations, and hands-on activities rather than just lecture-based discussions. Laboratory classes were often described as exciting and memorable because they allowed informants to observe chemical reactions firsthand and

apply theoretical concepts in real-life situations. One informant enthusiastically recalled a butane laboratory activity as one of the most enjoyable experiences in chemistry.

(Ang naka nice pud sa subject kay naa mi mga activities na kanang mag kalayo kalayo sa kamot katong butane, na experience pud to namo and its very hands-on.) One nice thing about the subject was that we had activities, like working with butane, which was very hands-on (I1).

(Actually sa laboratory man gud is like doing in real life kung unsa tung gipng discuss ba, kay if discussion man gud siya dili kaayo nimo siya ma kuan like mao na siyay methyl, but if Naa naka sa lab makita na nimo ng reaction kung unsa jud ang nahitabo ba.) Actually, in the laboratory, it is like doing in real life what was discussed because if it is only discussion, you cannot fully understand it, like identifying what methyl is, but when you are already in the lab, you can see the reactions and what is really happening (I7).

(In my experience, the theory only sticks when you see it in action. For instance, studying PH levels is boring as a theory, but it becomes fascinating when you apply it to why certain skincare products burn skin, di ba?) In my experience, theory only sticks when you see it in action. For example, studying pH levels is boring in theory, but it becomes interesting when applied to why certain skincare products burn the skin, right? (I5).

(Sa among organic chem kay gipagama mi ato ug sapatos, which is very good to me kay I'm an kuan creative person so murag naganahan ko didto na time.) In our organic chemistry we were tasked to create a shoe, which is very good for me because I am a creative person, so I kind of like it that time (I1).

(Karon, kabalo na ko sa consequences kung dili ko mag-study sa chemistry. Kung imong environment kay helpful ang mga tao, dako jud na siya ug effect) Now, I already know the consequences if I do not study chemistry. If your environment has helpful people, it really has a big effect (I3).

(Ang nakanindot kay naa sila atong dulaan, katong circle-circle na pwede ma attach which is ma visualize, ma model nimo ug unsa gud ang structure.) The nice thing is they have those toys, those circle-circle that can be attached which you can visualize, you can model what the structure really is (I1).

These statements reflect that informants learn chemistry more effectively through experiential and interactive approaches that allow them to visualize and apply concepts directly. Targeted methods, including the use of tactile 3D molecular model kits (known to informants as "circle-circle" toys), participating in hands-on chemical experiments (like the butane experiment), and directly linking abstract theories to everyday experiences (for instance, talking about pH levels in skincare items), significantly narrowed the learning gap. In light of these findings, chemistry educators ought to shift from exclusively lecture-based methods to incorporating regular visual demonstrations, employing physical modeling resources, and facilitating peer-tutoring sessions within laboratory settings. Learning is more effective when students actively participate in tangible experiences and reflection, aligning with Kolb's 1984 Experiential Theory. Furthermore, Kovarik et al. (2022), stated that active learning fosters an inclusive classroom and laboratory setting that can improve the retention of groups that have historically been underrepresented in science, technology, engineering, and mathematics (STEM). In visual demonstration and interactive activities, Rahmawati et al. (2021), supported that visual materials help learners process information more effectively by integrating new knowledge with prior understanding and improving logical thinking.

Theme 7: Flowers after the Rain

Table 7 shows the last subtheme, Flowers after the Rain, which reflects the informants' personal growth, realizations, and resilience developed through their experience in chemistry.

Subject Probed	Core Ideas	Code	Essential Theme
Non-STEM BS Biology students' lived experiences in developing resilience, discipline, and personal growth through chemistry learning	- Perseverance - Self-improvement - Discipline and patience - Academic responsibility - Appreciation of learning	- Resilience - Growth mindset - Academic maturity - Self-development - Persistence	Flowers after the Rain

Table 7. Lived experiences of non-STEM biology students in terms of personal growth and realizations developed through chemistry learning

This theme shows the informants' personal growth, realizations, and resilience developed through their experience in chemistry. Although chemistry was frequently described as difficult and emotionally exhausting, informants eventually recognized that these struggles helped them become more disciplined, patient, and determined learners. Some informants admitted that their previous study habits and attitudes contributed to their difficulties, motivating them to become more serious and disciplined in their academics.

(Honestly no, as a Biology student makita gud nako siya na very important ang chemistry kay dili jud siya ma bulag sa biology, like generally speaking. Example, tanan na life processes) Honestly no, as a Biology student I can really see that chemistry is very important because it really cannot be separated from biology, like generally speaking. For example, all life processes. (I1).

Looking back, that moment of breakdown was actually necessary because that's where I learned patience, not just with the subject but with myself, and I think that's something non-STEM students care about (I5).

(Bisan unsaon nimog likay kay naa man so dili jud mawala ang chemistry, kay gamit ang chemistry for everyday life, bisan asa pana mo gawas gyud ang chemistry.) No matter how much you try to avoid it, chemistry will not really go away because it is used in everyday life; wherever you go, chemistry will always be present (I2).

And honestly, sometimes the traveler appreciates the view more than the locals who take it for granted. (I5).

(Kay you know, tungod sad sa akong pagka interested sa science, so nadala ra pud nako ang part sa chemistry. Not totally maka ingon ko na good siya, pero one thing pud kay murag rapud kog nakat-on gamay, like naa rapud koy na gain sa subject.) Because of my interest in science, I was also able to carry over the chemistry part. I cannot fully say it was good, but one thing is I also learned a little and gained something from the subject (I1).

Informants emphasized the importance of adaptive learning strategies and shift toward a growth mindset, although the rate of success in overcoming barriers varied. Informants who demonstrated greater resilience often possessed key personal factors, such as strong intrinsic motivation to pursue a career in science and high self-efficacy, alongside crucial contextual factors like immediate access to supportive peer study groups and responsive, approachable instructors. Students who developed a growth mindset are more likely to embrace challenges and persist despite the difficulties (Dweck, 2006). This is consistent with findings from studies conducted in Philippine universities, where non-STEM students also relied significantly on peer-led support to navigate demanding science programs (Paraguas, 2025; Vega, 2024), as well as with global studies indicating that high self-efficacy effectively reduces the "chemistry gap" (Bandura, 1997; Chestnut & Johnson, 2025). As the informants-built confidence through practice and social support, their belief in their ability to succeed increased, thereby accelerating their academic adjustment compared with those who withdrew.

Limitations of the Study

Although this research offers important phenomenological insights into the academic experiences of non-STEM BS Biology students, certain limitations need to be recognized to maintain scholarly transparency. Initially, the research is based on a limited sample of seven (7) participants, which constrains the applicability of the results. Secondly, the information was collected from a single-institution setting at a private university in Negros Oriental, which might not entirely reflect the experiences of non-STEM students in public schools or other geographic areas. Third, the results rely on subjective self-report assessments obtained via interviews, which may be influenced by recall bias or the desire to present oneself favorably. Lastly, this research does not include objective academic performance metrics, like numerical grades or standardized chemistry exam scores, to relate to the students' self-reported success in coping. Future studies would gain from employing mixed-method strategies across various institutions to confirm and broaden these qualitative results.

Conclusion and Implications

The findings reveal that non-STEM BS Biology students experience substantial challenges in chemistry due to limited prior knowledge, unfamiliar scientific concepts, and the subject's mathematical demands. Despite these barriers, the students demonstrated resilience by adopting effective coping strategies, including self-directed learning, peer collaboration, and the use of online resources. Supportive teachers, classmates, and engaging laboratory experiences further enhanced their confidence, motivation, and academic adjustment, illustrating that meaningful support can transform initial struggles into opportunities for growth and learning. These findings also underscore the need for higher education institutions to

implement targeted interventions that bridge the academic "chemistry gap." Establishing preparatory chemistry and mathematics bridging programs, institutionalizing peer-tutoring initiatives, and strengthening faculty development in inclusive and adaptive teaching practices can better support non-STEM students' transition into science-intensive programs, ultimately promoting equitable learning opportunities and improved academic success.

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Data Availability Statement

Data sharing is not applicable to this article because no new datasets were generated or analyzed during the study. All information utilized in this work was derived from previously published sources, which are appropriately cited in the reference list.

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Appendices

No appendices are attached to this study.