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Bridging the Gap: Enhancing Science Learning for Social Science Students

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Abstract
Many social science students at the Instituto Católico para a Formação de Professores (ICFP) Baucau, Timor-Leste, face difficulties when studying natural science in their second year because of their different academic backgrounds. This study aims to explore strategies that make natural science learning more accessible and engaging for these students. Using a literature review of recent research, the paper examines teaching methods that enhance motivation and understanding. Key approaches include hands-on experiments, clear explanations, interactive activities, and the use of real-life examples connected to students' social and cultural contexts. The findings show that when science lessons are simplified, contextualized, and linked to practical experiences, students become more motivated and confident in their learning. These strategies not only improve comprehension but also make science more meaningful for learners from non-science backgrounds. The study provides recommendations for teachers at ICFP Baucau to design inclusive and engaging lessons that support social science students in successfully learning natural science.

Keywords: *Natural Science, Social Science Students, Teaching Strategies, Student Motivation, ICFP Baucau*

1. Introduction

Many students who enroll at Instituto *Católico para a Formação de Professores* (ICFP) in Baucau come from a social science academic background. When these students reach their second year, they are required to study natural science subjects, which often brings new learning challenges. The differences in academic focus and preparation between social science and natural science make it difficult for students to engage effectively (Netshivhumbe & Mudau, 2021; Gondao & Paglinawan, 2025). This transition often lowers students' motivation and confidence in learning natural science (Woitowich *et al.*, 2022).

Research in motivation theory shows that students learn more effectively when their needs for competence, autonomy, and relevance are supported (Deci & Ryan, 2020). Similarly, formative assessment practices strengthen confidence and learning when applied well (Wafubwa, 2020). Problem-based learning makes lessons more engaging by connecting them to real life (Schmidt *et al.*, 2020). This idea also reflects global education reports that stress fairness and relevance in science learning (UNESCO, 2022).

Previous studies highlight the benefits of contextual and interactive teaching methods in science education (Tindan & Anaba, 2024; Lee & Buxton, 2023). They show that making science learning relevant to students' experiences improves outcomes. However, there is still limited research focusing on the needs of social science students adapting to natural science. Most research has focused on science students or the general public, leaving a clear gap (Syafruddin, 2024; Lee & Orgill, 2025).

This study reviews recent literature on teaching methods, motivation theories, and interdisciplinary approaches to identify strategies that support social science students in learning natural science. It focuses on approaches that improve motivation, engagement, and comprehension, while also considering the local cultural context (Priya & Rinki 2021; Penuel *et al.*, 2022). The main goal is to answer the question: What teaching strategies effectively enhance natural science learning and motivation among social science track students at ICFP Baucau?

Hands-on activities have been widely recognized as a powerful tool in science education. Studies by Ojie-Ahamiojie (2024) show that experiments and practical work improve students' understanding by allowing them to experience concepts directly. These active learning methods also enhance motivation, especially among students who might find traditional lectures less engaging (Gondao & Paglinawan, 2025; Priya & Rinki, 2021). Through doing and observing, students are more

likely to retain knowledge and develop positive attitudes toward science.

Clear and simplified explanations are also essential when teaching science to students from non-science backgrounds. Tindan & Anaba (2024) note that difficult scientific terms can discourage students with limited language or background knowledge. Clear, simple language and step-by-step explanations help them build understanding (Lee and Orgill, 2025; Penuel *et al.*, 2022). These activities make learning easier and help students build their confidence.

Table 1. Challenges in Science Learning for Social Science Track Students

Challenge	Explanation	Source
Low motivation and confidence	Students find natural science hard due to unfamiliar content	Netshivhumbe & Mudau, 2021.
Lack of hands-on experience	Limited practical activities reduce engagement	Tindan & Anaba, 2024; Martinez *et al.,* 2023
Complex terminology and explanations	Scientific language barriers hinder understanding	Lee and Orgill, 2025; Penuel *et al.*, 2022
Disconnect with local culture and context	Difficulty relating science to everyday life reduces interest	Priya & Rinki, 2021; Lee & Buxton, 2023

Interdisciplinary teaching methods show promising results for integrating science into social science contexts. Sharma & Shukla (2023) state that connecting scientific concepts to social, cultural, or environmental issues makes learning more relevant. This relevance helps bridge the gap between abstract theory and students' lived experiences (Lee & Buxton, 2023; Ojie-Ahamiojie, 2024). Social science students appreciate seeing how science topics apply to their interests and communities, which fosters engagement.

Contextualizing science learning into local social and cultural settings has been shown to increase student motivation and retention. Research by Priya & Rinki (2021) suggests that local examples and case studies make science lessons more meaningful. Students feel a stronger connection and are more motivated to learn when topics relate to their cultural environment (Netshivhumbe & Mudau, 2021; Penuel *et al.*, 2022). This strategy can be particularly useful at ICFP Baucau, where local culture plays a vital role.

Motivation theories support the idea that student engagement grows when learners see value in what they study. Tindan & Anaba (2024) explain that intrinsic motivation increases when students find learning purposeful and connected to their goals. Offering choices, encouraging curiosity, and providing feedback are proven techniques to sustain motivation (Gondao & Paglinawan, 2025; Lee and Orgill, 2025). Applying these motivators in natural science education benefits social science students transitioning into new content.

Interactive learning using technology and collaborative group work further enhances students' active involvement. Ojie-Ahamiojie (2024) found that digital simulations and group experiments promote deeper understanding through discussion and shared exploration. Collaborative learning encourages peer support and communication, which is especially helpful for learners with different academic strengths (Lee & Buxton, 2023; Penuel *et al.*, 2022). This promotes a more inclusive learning environment.

Table 2. Effective Strategies to Enhance Science Learning for Social Science Students

Strategy	Description	Effectiveness	Source
Hands-on activities and experiments	Practical learning increases understanding and motivation	High	Ojie-Ahamiojie, 2024; Priya & Rinki, 2021
Clear and simplified explanations	Breaking down complex concepts supports comprehension	Medium to high	Tindan & Anaba, 2024; Lee and Orgill, 2025
Interdisciplinary teaching	Linking science to social, cultural issues makes learning relevant	High	Sharma & Shukla (2023) ; Lee & Buxton, 2023
Culturally relevant examples	Using local contexts increases student engagement	High	Penuel *et al.*, 2022; Priya & Rinki, 2024
Collaborative group work	Peer learning promotes deeper understanding and inclusion	Medium to high	Ojie-Ahamiojie, 2024; Martinez *et al.*, 2023

Studies indicate that adapting curriculum materials to the backgrounds of social science students improves learning outcomes. Syafruddin (2024) and Priya & Rinki (2021) recommend modifying textbooks and resources to include more practical examples and interdisciplinary connections. This helps students engage with difficult concepts without feeling overwhelmed. Custom materials support different learning styles, which is important at ICFP Baucau.

Teacher attitudes and professional development play a critical role in successfully implementing these strategies. Research by Gondao & Paglinawan (2025) highlights that teachers need training in hands-on methods and interdisciplinary approaches to feel confident in delivering them effectively. Supportive teacher attitudes directly impact student motivation and achievement (Lee and Orgill, 2025; Ojie-Ahamiojie, 2024). Thus, investing in teacher development is essential.

Finally, assessment methods should align with active and contextual learning strategies. Traditional exams may not fully capture students' understanding or skills developed through experiments and projects (Tindan & Anaba, 2024; Lee & Buxton, 2023). Using diverse

assessment types such as presentations, portfolios, and group work reports reflects students' real learning and supports deeper engagement with the material.

2. Research Methods

This study reviews literature to find effective strategies for improving natural science learning among social science track students at ICFP Baucau. Thirty recent peer-reviewed studies from Google Scholar, JSTOR, and ScienceDirect were analyzed, focusing on science education, motivation, and interdisciplinary teaching. The review also considers motivational theories like self-determination and expectancy-value (Schunk, Pintrich, & DiBenedetto, 2025) and global research showing how teacher training and instructional design affect student outcomes (OECD, 2023).

The selection criteria included research addressing teaching methods suitable for students shifting from social science to natural science. Each study was examined for details such as sample size, teaching techniques (e.g., hands-on activities, clear explanations, contextual learning), and educational outcomes. When available, quantitative data and replication details were recorded to facilitate comparison of results.

Data analysis involved descriptive synthesis by grouping similar findings into thematic categories. This method allowed a comprehensive overview of evidence-based practices without conducting new experiments. Established teaching methods were referenced, and any new approaches were explained clearly to ensure reproducibility. This study aims to provide practical recommendations for educators at ICFP Baucau based on the latest research.

3. Results and Discussions

3.1 *Results*

This review found that social science students at ICFP Baucau face several challenges when studying natural science. Many of them struggle to understand scientific terms and concepts because they haven't encountered these topics before (Netshivhumbe & Mudau, 2021). This makes learning feel confusing and lowers their confidence. Also, many students don't feel motivated because they think science isn't related to their social science studies (Woitowich *et al.*, 2022). These problems make it harder for them to stay interested and do well in science classes.

One of the best ways to help students is through hands-on activities and experiments. When students take part in practical activities, they understand the concepts better because they see and do things directly (Tindan & Anaba, 2024; Priya & Rinki, 2021). Abrahams and Millar (2008) explain that experiments work best when they help students truly understand the concepts, rather than being done as stand-alone tasks. This highlights the value of making experiments meaningful in science learning. Another helpful method is using clear and simple explanations. Breaking down complex ideas into easy-to-understand parts helps students follow along and learn better (Lee and Orgill, 2025).

Linking science lessons to social and cultural topics also works well. It helps students see why science matters in their daily lives and communities. For example, teaching science through local environmental or cultural issues motivates them to learn (Lee & Buxton, 2023; Penuel *et al.*, 2022). This finding aligns with research stressing that science education must remain relevant to students' real lives and future roles in society (Holbrook & Rannikmäe, 2007; Osborne & Dillon, 2021).

Students also benefit from working together in groups and talking about what they learn. When they discuss ideas and share different points of view, they understand science better and learn what they might not get alone (Ojie-Ahamiojie, 2024). This finding supports research showing that connecting different subjects helps students carry what they learn in one area into another (Becker, 2022). Digital collaboration tools can also enhance group learning and extend participation beyond the classroom (Amaral *et al.*, 2023). Schmidt *et al.* (2020) note that when lessons are linked to real-world problems, students find learning more meaningful and feel more motivated.

Additionally, teachers need proper training to use these methods well. The studies show that teacher preparation is important to make science lessons more interesting and effective (Gondao & Paglinawan, 2025). Finally, using different ways to check learning, like projects and presentations, is better than just exams alone (Tindan & Anaba, 2024).

3.2 Discussions

The findings show that moving from social science to natural science is not easy for these students. One big problem is the scientific language and tough ideas, which makes it important for teachers to explain clearly and in manageable steps. When teachers make science easier to understand, students can learn and remember better (Netshivhumbe & Mudau, 2021).

Learning by doing, like through experiments, is a powerful way to spark students' interest and help them understand science. For social science students, who may see science as too abstract, hands-on activities make the subject feel real and alive. This suggests that science classes should include more practical activities to help students stay motivated (Tindan & Anaba, 2024; Priya & Rinki, 2021).

Making science lessons relevant to students' communities and cultures helps them realize why science matters. When students see the connection between science and real-life social or environmental issues, they become more eager to learn (Lee & Buxton, 2023; Penuel *et al.*, 2022). Tanjung *et al.* (2025) emphasize that culturally relevant pedagogy strengthens learning by connecting content with learners'

worldviews. Similarly, Aikenhead & Michell (2011) highlight the importance of bridging local cultural knowledge with scientific ways of knowing, which is especially valuable in the Timor-Leste context.

Group work and discussions also make a big difference. Learning with classmates helps students share ideas and understand things better, especially when they feel unsure studying alone. This teamwork creates a supportive classroom where everyone can succeed (Ojie-Ahamiojie, 2024

Teachers play a crucial role in ensuring these methods are effective. They require training in hands-on, clear, and contextual teaching techniques that cater to the students' needs. With good support, teachers can improve students' learning experiences and outcomes (Gondao & Paglinawan, 2025). Darling-Hammond and Hyler (2020) also note that teacher preparation should develop deeper learning strategies to equip educators with skills that promote meaningful engagement across diverse learners.

In conclusion, no single teaching method is enough. Combining clear explanations, hands-on activities, real-life connections, and group learning creates the best environment for social science students to succeed in natural science. Global perspectives also emphasize that integrated and interdisciplinary approaches are crucial for preparing learners in an interconnected world (Zhao, Liu & Wang, 2025; OECD, 2023).

4. Conclusion

This study found that social science students at ICFP Baucau have many difficulties learning natural science. They often struggle with the scientific language and feel less motivated because science seems very different from their usual subjects. However, using hands-on activities, easy-to-understand explanations, and relating science to their own culture and community can help these students feel more interested and understand better. It is also important for teachers to be well-prepared and to encourage group work, as these make learning more enjoyable and effective.

These findings show that improving how natural science is taught to social science students requires several approaches working together. Making lessons more relevant and interactive can help students feel more confident and motivated. This study suggests that teachers, curriculum planners, and schools should work to create learning experiences that connect science to students' everyday lives. Further research can look into how well these ideas work in classrooms and find other ways to support students who might need extra help.

The findings of this study recommend several important implications for enhancing natural science learning among social science track students at ICFP Baucau. Educators are encouraged to incorporate interactive strategies such as hands-on activities, clear explanations, and the contextualization of science topics within local social and cultural issues. Evidence suggests that these approaches improve engagement and comprehension for students from non-science backgrounds. Collaborative learning environments also play a vital role, as group work and peer discussions foster inclusion and deeper understanding (Ojie-Ahamiojie, 2024; Zydney & Warner, 2020).

Teacher training is another essential component. Ongoing professional development has been shown to increase confidence and effectiveness when applying interdisciplinary methods (Gondao & Paglinawan, 2025; OECD, 2023). Equipping teachers with the skills to design lessons that are interactive, contextual, and relevant ensures a more inclusive classroom experience. Similarly, curriculum designers should prioritize flexibility by integrating real-life applications and social issues into natural science courses. Such approaches make science more meaningful and engaging for students from social science backgrounds.

Assessment should match the active way students learn. Traditional exams alone often miss important skills and a deeper understanding. Using projects, presentations, or portfolios gives a more authentic picture of what students know and how they think.

Beyond immediate classroom applications, the findings point to directions for future research. Empirical studies are needed to evaluate how effectively these strategies can be implemented in the ICFP Baucau context and to identify additional support systems for students with diverse academic backgrounds. Such research would provide valuable evidence for improving both policy and practice.

Finally, social science students themselves play a crucial role in their learning success. Actively participating in experiments, group discussions, and peer learning activities can deepen understanding and build confidence. Students should also be encouraged to ask questions, seek support when needed, and relate scientific concepts to everyday life and social contexts. Developing consistent study habits, managing time effectively, and using varied resources such as videos, practical activities, and real-world examples can further strengthen their learning outcomes in natural science.

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