Original Research Article
Sustainable Management of Agrifood Systems: Interdisciplinary Workshop as a Learning Tool in Bioresource Technology in secondary and technical education in Agriculture at ECIT Riachão do Poço, Paraiba, Brazil

ABSTRACT

This article addresses the project of an Interdisciplinary Workshop, AGROTEC, and the implementation of the sensory garden at ECIT Riachão do Poço, in Paraíba, as an interdisciplinary learning tool for high school and technical students in agriculture, including the topics of bioresource technology. The municipality of Riachão do Poço, located in the state of Paraíba, with a semi-arid tropical climate, is rich in agricultural practices. The objective of the Technical Course in Agriculture at the school seeks to promote a comprehensive and contextualized education. The workshop aimed to integrate knowledge from the disciplines of plant health, agricultural soils, horticulture, olericulture and bioresource technology, providing students with practical and meaningful experiences for their training. The methodology used included holding an interactive workshop, where students could apply theories in a practical environment, encouraging collaboration and active learning. At the end, students also had a class on media content management, disseminating the work carried out in the workshop. The results demonstrated an increase in student motivation, resulting in greater learning, obtaining higher grades than at the beginning of the subjects, in addition to a greater awareness of sustainability and agroecological practices. The project not only enriched the students' education, but also strengthened the school community, demonstrating the success of the interdisciplinary approach in technical education. The experience reaffirms the importance of pedagogical innovations in the training of critical professionals prepared for the challenges of the agricultural sector, especially in the areas of bioresource technology.

Keywords: Sustainability, Agribusiness, Technical Education, Bioresource Technology, Interdisciplinary Learning.

1. INTRODUCTION

The ECIT (Integral Citizen Technical School) is an educational institution that aims to promote comprehensive education, focusing on the civic and professional development of students. It stands out for its pedagogical approach that integrates theory with practice, facilitating contextualized knowledge construction (SCARPA, 2015). The Integral Citizen Technical Schools were established as part of a strategy by the Federal Government, in partnership with state governments, to expand and enhance the quality of technical education in the country.

The conception of ECIT is based on the premise that comprehensive education, combined with technical training, can provide a more complete formation and better prepare young people for the challenges of the labor market and citizenship. The ECIT model promotes a balance between technical training and the holistic development of the student, preparing them both for the job market and for the exercise of citizenship.

Brazil is one of the largest agricultural producers in the world, and the demand for qualified professionals in the agricultural sector is increasing. The ECIT, by offering technical courses in agriculture, plays a crucial role in training these

professionals. Integrated technical education allows students to develop specific competencies for the sector, such as sustainable management of natural resources, application of agricultural technologies, and management of rural enterprises.

Interdisciplinary teaching has been widely recognized as an effective approach to promoting meaningful learning in diverse educational contexts (LEMKE, 2001). The proposal for an interdisciplinary workshop within the framework of secondary and technical education in Agriculture, conducted at the Integral Citizen Technical School (ECIT) Riachão do Poço, seeks to integrate knowledge from the disciplines of plant health, agricultural soils, horticulture, and vegetable cultivation in the implementation of a sensory garden using agroecological practices.

In recent years, teaching-learning methodologies have been the subject of intense research and discussion, particularly regarding the effectiveness of active approaches. Among these approaches, workshops emerge as an innovative and effective tool, promoting deeper and more meaningful learning (SCARPA, 2015). Active teaching involves engaging students in activities that promote analysis, synthesis, and evaluation, characteristics that are intrinsic to workshops. This format, which combines theory and practice, allows participants to apply knowledge in real situations, enhancing information retention and the development of practical skills (SILVA, 2015).

Furthermore, literature indicates that workshops not only encourage active participation but also promote collaboration among participants, strengthening collective learning. Social interaction during learning can enhance the understanding and application of complex concepts. This collaborative dynamic is particularly relevant in diverse educational contexts, where the exchange of experiences and perspectives enriches the learning process(LIDAR, 2005).

Finally, the use of workshops as a pedagogical tool aligns with contemporary educational guidelines, which seek a more comprehensive formation adapted to the needs of the labor market. The development of practical competencies is essential to prepare students for current professional challenges.In light of the above, this article aims to explore the effectiveness of the interdisciplinary workshop as a teaching strategy that not only facilitates learning but also prepares students for an ever-changing environment.

2. MATERIAL AND METHODS

The ECIT Riachão do Poço is located in the municipality of Riachão do Poço, in the state of Paraíba, Brazil, (Figure 1) with geographic coordinates of 7°16′18″S and 35°56′23″W. The city is characterized by a semi-arid tropical climate, with average temperatures ranging from 23°C to 30°C and annual precipitation around 800 mm, factors that directly influence local agribusiness activities.

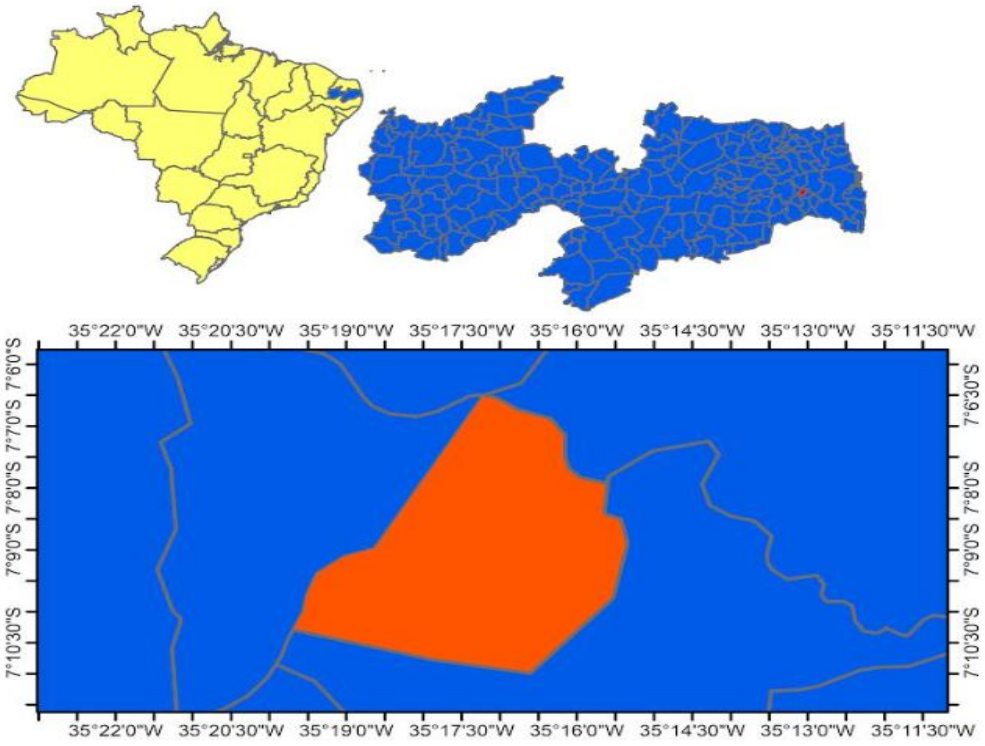


Figure 1: Location of the municipality Riachão do Poço - Paraiba, Brazil.

The workshop project and the implementation of the sensory garden involved students in practical activities that explored the interaction between the disciplines of Plant Health, Agricultural Soils, Horticulture, and Vegetable Cultivation. The sensory garden, according to Andrade et al. (2021), provides a tactile, olfactory, and visual experience, contributing to the development of students' sensory and cognitive skills.

During the workshop, students participated in practical sessions where they applied theoretical concepts from plant health. This type of workshop promotes the exchange of experiences and the application of sustainable practices, helping participants to effectively identify and manage pests while minimizing pesticide use and promoting biological control techniques. Additionally, training in plant health enhances awareness of the importance of biodiversity and sustainable agricultural practices, contributing to environmental preservation.

The workshop on horticulture and vegetable cultivation played a vital role in educating students about agriculture, addressing essential practices for growing gardens and vegetables. These events offered opportunities to learn about cultivation techniques, soil management, irrigation, and pest control, all fundamental for the successful production of vegetables.

The workshop on agricultural soils aimed to equip students with an understanding of the importance of soil health in agricultural production. Soil is a vital resource that supports plants and directly influences the productivity and quality of crops. During the workshop, participants had the opportunity to learn about soil composition, its physical and chemical properties, soil management, and fertilization, as well as how these factors affect plant growth. Students completed a questionnaire at the beginning and end of the project, which included questions related to the subjects taught throughout the academic term.

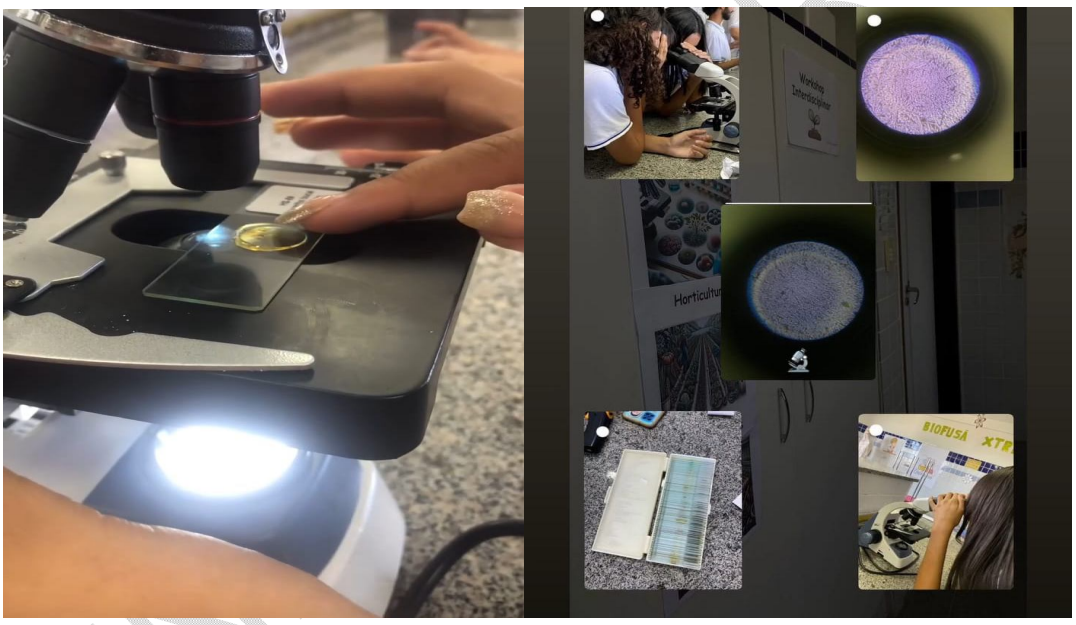
3. RESULTS AND DISCUSSION

The execution of the workshop highlighted the importance of collaborative learning and the exchange of knowledge among disciplines. Students reported an increased interest and motivation for agricultural activities, as well as a deeper understanding of the topics covered. Interdisciplinary workshops foster an active learning environment where students become protagonists in their educational process. The practical experience in the sensory garden allowed students to concretely apply the knowledge acquired in the classroom. Furthermore, the use of agroecological practices contributed to raising students' awareness of sustainability and the importance of environmental preservation.

The workshop conducted at ECIT Riachão do Poço, centered on the sensory garden, provided a rich and diverse practical experience that encompassed the disciplines of Plant Health, Agricultural Soils, Horticulture, and Vegetable Cultivation. During the activities, students actively participated in plant management practices, pest and disease identification, and agroecological cultivation techniques that integrated theoretical concepts with everyday agricultural situations.

3.1 Plant Health Practices

In the area of plant health, students learned about integrated pest and disease management, applying techniques for identification, monitoring, fungus identification and disease control (COSTA,*et. al.*, 2019). The use of biological and chemical methods to protect crops was discussed, highlighting the importance of sustainability in modern agriculture (SOUSA, 2023). Training in plant health is essential for healthy and sustainable agricultural production, enabling students to understand the complexity of agricultural ecosystems (COSTA, *et. al.*, 2023);



Source: Students and the professor and coordinator of the Technical Course in Agriculture at ECIT Riachão do Poço, PB, Brazil.

3.2 Agricultural Soils

Students also had the opportunity to explore soil quality and its characteristics through simple practices that helped them understand soil fertility and conservation (SILVA, *et. al.*, 2019; SOUSA,*et. al.*, 2023). This practice is crucial, as healthy soils are fundamental for food production and environmental sustainability (COSTA, *et. al.*, 2019; SUDDARTH, *et. al*., 2019). Interaction with the soil not only enriched their technical knowledge but also encouraged environmental responsibility among the students.

Source: Students and the professor and coordinator of the Technical Course in Agriculture at ECIT Riachão do Poço, PB, Brazil.

3.3 Horticulture and Vegetable Cultivation

In the disciplines of horticulture and vegetable cultivation, students participated in planting different plant species, experimenting with cultivation techniques under various conditions, and creating drip irrigation systems using recyclable materials, We used works found in the literature to base our workshop focused on this discipline, aiming at ways of managing and cultivating plants (COSTA, *et. al.,* 2020; LUCENA, *et. al.,* 2021; COSTA *et. al.,* 2024; COSTA, *et. al.,* 2024). The teamwork involved in planting and caring for the plants fostered a sense of community and cooperationessential skills for their future professional endeavors. Practical activities like these increase student engagement, resulting in more meaningful and lasting learning experiences.

Source: Students and the professor and coordinator of the Technical Course in Agriculture at ECIT Riachão do Poço, PB, Brazil.

The success of the workshop can be attributed to the active involvement of students and the practical application of the knowledge acquired. The hands-on activities not only provided contextualized learning, reflected in a significant increase in exam scores, before and after workshop (Figure 2), but also reinforced the importance of collaborative work. Collaborative learning in practical work environments promotes student autonomy and stimulates the development of essential skills for the job market.

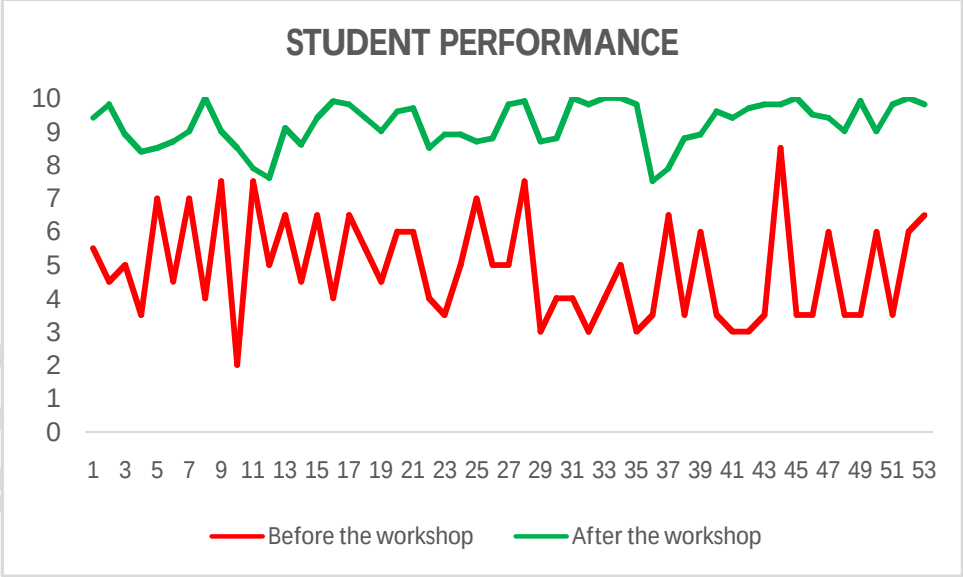


Figure 2: Student Performance of the Technical Course in Agriculture at ECIT Riachão do Poço, PB, Brazil.

Moreover, the display of photos from the activities will allow the school and the community to visualize the processes and outcomes, highlighting the significance of the practices developed and student engagement. This visual record serves as a powerful tool for promoting the project and inspiring future students and educators to adopt similar approaches. In

summary, the workshop not only fostered integration among the disciplines but also provided a valuable and transformative learning experience, preparing students for the challenges of modern agribusiness.

4. CONCLUSION

The primary objective of the workshop was to integrate various areas of knowledge, promoting a more holistic learning experience. This initiative reaffirms the importance of pedagogical innovations in training critical professionals who are prepared to face the challenges of the agribusiness sector, especially in the fields of biotechnology and bioresource technology.

One of the main outcomes of the project was the development of practical skills that complemented the students' theoretical knowledge. The interaction among the disciplines of plant health, agricultural soils, horticulture, and vegetable cultivation provided students with a deeper understanding of the content, highlighting the importance of interdisciplinarity in the educational process. This approach fosters the formation of more qualified professionals ready to tackle market challenges.

The experience with the sensory garden also promoted environmental awareness among students. The implementation of agroecological practices encouraged critical reflection on sustainability and the preservation of natural resources, which are essential in a world facing increasing environmental challenges. This awareness is vital for shaping responsible and engaged citizens, aligning with the educational objectives of the ECIT to promote comprehensive education.

The project also contributed to strengthening the school community by fostering collaboration between students and teachers. The sensory garden became a space for interaction and learning, where everyone could share knowledge and experiences. This communal aspect is crucial, as collaborative learning enriches the educational process and strengthens the bonds among participants.

Another significant point is the increase in student motivation and engagement in school activities. By experiencing practice in a dynamic and engaging environment, students displayed a greater interest in learning. The interactive workshop helped students become protagonists in their learning process, resulting in a more active and participatory school environment.

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