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CONDUCTING LABORATORY EXPERIMENTS IN SCIENCE: STRENGTHENING THE ART OF PRACTICAL LEARNING AND LABORATORY SKILLS DEVELOPMENT IN SCIENCE

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ABSTRACT

This study explored the role of laboratory experiments in strengthening practical learning in science education beyond the COVID-19 pandemic. It focused on the lived experiences of Junior High School students, the challenges they encountered, and the coping mechanisms they employed, as well as how teachers facilitated laboratory skill development. Using a qualitative phenomenological approach, data were collected through interviews with selected students from public secondary schools in Cotabato. Findings revealed that laboratory experiments enhanced students' understanding, curiosity, and engagement through hands-on and collaborative learning. However, students faced significant challenges during and after the pandemic, including limited resources, communication barriers, and gaps in prior knowledge. Despite these difficulties, students coped through collaboration, self-directed learning, resilience, and critical thinking. The study highlights the importance of experiential learning and the continued integration of laboratory activities in science education to improve student outcomes.

INTRODUCTION

The COVID-19 pandemic significantly disrupted the educational system, particularly in science education where laboratory experiments are essential for developing practical skills and scientific understanding. During lockdowns in the Philippines, the shift to modular learning resulted in limited access to laboratory facilities, depriving students of hands-on experiences crucial for enhancing scientific literacy and reducing laboratory anxiety. Previous studies have emphasized the importance of laboratory work in improving student attitudes, engagement, and academic performance. However, there remains a gap in understanding how

students transitioned back to face-to-face laboratory learning after the pandemic. This study aims to examine students' lived experiences, challenges, and coping strategies in conducting laboratory experiments beyond the pandemic, as well as the role of teachers in facilitating laboratory skill development. It also seeks to identify effective teaching methods that strengthen students' practical science skills.

METHODS

This study employed a qualitative phenomenological research design to capture the lived experiences of students in conducting laboratory experiments. The research was conducted among Junior High School students from selected public secondary schools in the Municipality of President Roxas and nearby areas in Cotabato. A purposive sampling method was used to select 25 participants who could provide relevant insights into the phenomenon. Data were gathered through in-depth interviews using structured interview guides, audio recordings, and consent forms. The collected data were transcribed verbatim and analyzed using thematic analysis, which involved coding, categorizing, and identifying key themes. Ethical considerations such as informed consent, confidentiality, and respect for participants were strictly observed throughout the study .

RESULTS

The findings revealed that students' experiences with laboratory experiments beyond the pandemic were largely positive, as hands-on activities enhanced their understanding of scientific concepts and stimulated curiosity. Experiments involving real-life simulations, such as volcanic reactions and biological processes, made learning more engaging and meaningful. Collaborative group work also played a significant role in improving teamwork, communication skills, and knowledge retention. However, students encountered several challenges, particularly during and after the pandemic, including limited access to laboratory materials, difficulty in communication due to health protocols, and gaps in prior knowledge caused by modular learning. These challenges affected their ability to fully engage in experimental activities. Despite these difficulties, students demonstrated resilience by seeking help from teachers and peers, engaging in self-study, practicing patience and faith, and applying creative problem-solving strategies. Additionally, teachers were found to play a crucial role in facilitating laboratory skill development by providing guidance, ensuring safety, and promoting experiential learning.

DISCUSSION

The results underscore the importance of laboratory experiments as a vital component of science education, particularly in fostering experiential learning and critical thinking. The findings align with Kolb's Experiential Learning Theory, which emphasizes learning through concrete experience, reflection, conceptualization, and experimentation. Hands-on laboratory activities not only enhance students' understanding but also increase motivation and engagement. However, the challenges identified in the study highlight the need for improved access to resources, better instructional support, and strategies to bridge learning gaps caused by the pandemic. The role of teachers is crucial in guiding students and creating a supportive learning environment that encourages inquiry and collaboration. Furthermore, the coping mechanisms demonstrated by students indicate the importance of resilience, adaptability, and self-directed learning in overcoming educational challenges. Overall, the study suggests that strengthening laboratory-based instruction and ensuring adequate support systems are essential for improving science education in the post-pandemic context.