

Decoding Impressions: A Phenomenological Inquiry into the Lived Experiences of Criminology Students' Confidence in Evidence Handling Developed through Forensic Science Course Exposure

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ABSTRACT

Practical laboratory training plays a central role in forensic science education, particularly in criminology programs, because it equips students with competencies for accurate and reliable evidence handling. This study employed a phenomenological design to examine criminology students' confidence in evidence handling based on their forensic science laboratory experiences and the impact of these experiences on perceived competence. The study gathered insights from students who completed the course and used purposive sampling to include those who obtained grades below 82 or failed, ensuring perspectives on competence and challenges. The researcher collected data through in-depth, semi-structured interviews in the vernacular language and recorded, transcribed, and analyzed them using Moustakas transcendental phenomenology in identifying the four core essences: acquiring immersive skills through fingerprinting, paraffin testing, and ballistics; building confidence while facing technical complexity and fears of contamination with instructor guidance and teamwork; encountering resource constraints, including limited equipment, large classes, and short sessions that hinder mastery; and developing ethical awareness through instruction emphasizing integrity, chain of custody, and procedural accuracy. The findings show that hands-on simulations bridge theory and practice and foster self-efficacy despite constraints. Participants reported higher confidence in tasks, such as evidence packaging, but greater difficulty with precision-demanding activities. The study recommended the need for scaffolded instruction, improved laboratory resources, and faculty development to prepare confident graduates capable of safeguarding evidence integrity in forensic practice within the Philippine context.

Keywords: Evidence Handling; Critical Thinking; Forensic Science Experiences; Hands-on Simulation; Practical Laboratory Experiences; Lived Experiences; Forensic Science Education; Confidence; Laboratory Training; Physical Evidence Management; Chain of Custody.

1. Introduction

Modern criminal justice requires criminology students to gain both technical proficiency and confidence in order to handle evidence effectively. This can be achieved through structured forensic science education and real-world laboratory experiences (Bilal and Sharif, 2025). Students enrolled in forensic courses are exposed to specialized fields like forensic chemistry, ballistics, fingerprint examination, and questioned document analysis, all of which require accuracy, moral consciousness, and adherence to established procedures in order to guarantee the integrity of the evidence and its admissibility in court (Roux et al., 2023; Bell, 2025). Due to variations in laboratory exposure, instructional quality, and resource availability, students' confidence in handling evidence varies greatly, despite the fact that experiential and simulation-based learning have been demonstrated to improve competence, critical thinking, and professional readiness (Willis et al., 2023; Nilendu, 2024; Hamnett and Mathews, 2025). Advances in forensic education around the world and in Asia demonstrate the importance of immersive training and state-of-the-art facilities in bolstering students' self-efficacy and ethical standards. However, despite current policy mandates, there are still implementation disparities, especially in the Philippines, due to a lack of equipment, inconsistent laboratory simulations, and instructional constraints (Allison, 2025). There is still a glaring research gap in qualitative, phenomenological studies that look at criminology students' lived experiences and how these experiences shape their confidence, ethical awareness, and perceived preparedness for real-world forensic practice

during laboratory-based forensic science courses (Zaki and Sobh, 2026; Alaba et al., 2026). This is because previous research has mostly focused on curriculum design, laboratory effectiveness, and measurable performance outcomes using quantitative approaches (Aleisa, 2026).

1.1. Study Objectives

This study explored the forensic science laboratory experiences of Criminology students and their impact on students' confidence in evidence handling. Specifically, it sought to answer the following questions:

- 1) What are the lived experiences of criminology students regarding their practical handling experiences during their laboratory activities in the forensic science courses?
- 2) What challenges and barriers do criminology students encounter that affect their confidence and competence in performing key evidence-handling tasks?
- 3) How do students perceive the role of laboratory-based forensic science instruction in shaping their ethical awareness, procedural accuracy, and readiness for fieldwork and courtroom evidence presentation?

2. Literature

This study was guided by two theoretical framework combining Self-Efficacy Theory (Bandura, 1997) and Experiential Learning Theory (Kolb, 1984). According to Self-Efficacy Theory, students' confidence in their capacity to complete tasks is influenced by a variety of factors, including verbal feedback, peer and instructor observation, mastery experiences, and emotional states. These factors collectively affect students' competence, judgment, and preparedness for professional forensic work. According to experiential learning theory, learning happens in a cycle through active experimentation, abstract conceptualization, reflective observation, and concrete experiences. Within the framework of forensic education, students' practical engagement with evidence constitutes tangible experiences, contemplation of achievements and mistakes fosters conceptual comprehension of procedural accuracy and ethical standards, and subsequent application of these insights improves technical proficiency and confidence. Combining these theories demonstrates how immersive, supervised lab experiences develop students' confidence and practical skills, preparing them for responsible and competent forensic practice.

3. Methods

This study explored criminology students' confidence in evidence handling as shaped by their experiences in forensic science courses. The participants were forensic science students enrolled in the Bachelor of Science in Criminology program, of whom 8 were males, and 6 were females, ranging in age from 20 to 24 years old. This study examined how criminology students develop confidence in handling evidence through their experiences in forensic science courses. Data were collected through interviews with selected participants to gain insights into criminology students' confidence in handling evidence through forensic science course experiences, to further understand how these experiences affect their academic growth, personal development, and career aspirations, and to help educators, policymakers, and institutions better support their academic progress and career development. The findings of this study were expected to help improve forensic science courses and ensure they better prepare students for the profession's challenges.

This study categorizes the students' lived experiences into five interconnected themes that collectively elucidate how exposure to forensic laboratories influences criminology students' confidence in evidence handling. Acquiring Immersive Skill through Realistic Forensic Experiences, Building Confidence while Navigating Challenges and Uncertainties in Evidence Handling, Experiencing Resource Constraints Hindering Hands-On Mastery of Evidence Handling, Facing Technical Complexity and Psychological Pressures Undermining Confidence, and Developing Ethical Awareness and Procedural Accuracy Through Guided Forensic Instruction. These themes collectively offer a comprehensive perspective on how experiential learning environments both challenge and enhance students' proficiency and self-assurance in managing forensic evidence.

3.1 Acquiring Immersive Skill through Realistic Forensic Experiences

Due to their exposure to real fingerprint examination methods, Participant 1 highlighted how engaging the laboratory experience was, suggesting that tasks' authenticity raised interest and perceived professional significance. Participant 2 indicated that the laboratory strengthened technical proficiency and procedural accuracy by emphasizing the acquisition of new knowledge, especially in the areas of appropriate evidence management and fingerprint gathering techniques. In contrast, Participant 5 emphasized the variety of tasks completed, such as fingerprint analysis, paraffin testing, money authentication, forgery analysis, and chemical tests, highlighting the thorough and interdisciplinary character of the instruction. All of these answers point to the fact that practical, diverse, and technique-focused laboratory experiences greatly improved students' involvement, skill development, and readiness for real-world forensic applications. These are their statements:

“My laboratory experience was very interesting and engaging because it allowed me to learn the actual techniques used in fingerprint examination.” (P1)

“I learned many new things, including how to properly handle evidence and the correct techniques for obtaining fingerprints.” (P2)

“We performed several activities, including the paraffin test, fingerprint examination, forgery analysis, money authentication tests, and chemical experiments.” (P5)

In addition, the participants show a shift from initial unfamiliarity to meaningful engagement, underscoring the transforming power of practical laboratory exposure in fostering forensic knowledge. Participant 1 revealed a foundational discovery of personal fingerprint characteristics and their functional relevance, indicating the laboratory's role in introducing core biometric concepts. Participant 7 described the experience as overwhelming yet surprising, suggesting that unexpected experimental outcomes challenged preconceived notions and stimulated cognitive engagement. Meanwhile, Participant 12 acknowledged the procedural difficulty involved in fingerprint identification but emphasized enjoyment despite the challenge, demonstrating productive struggle and intrinsic motivation. As a whole, the responses show that laboratory exercises, despite their complexity and difficulty, enhance experience learning, expand conceptual knowledge, and cultivate favorable attitudes for learning forensic skills (Kakar 2025). These are their answers:

“We performed several activities, including the paraffin test, fingerprint examination, forgery analysis, money authentication tests, and chemical experiments.” (P5)

“It is only here that I discovered what my fingerprints are and what their purposes can be.” (P1)

“The laboratory was overwhelming and surprising because I did not expect the experiments to work that way.” (P7)

Moreover, Participant 7 acknowledged that practical exercises improved comprehension more successfully than theoretical study alone. According to Participant 14, practical activities enhanced the training's perceived authenticity and professional value by highlighting the laboratory tasks' real-world applicability, especially their usefulness in confirming actual situations. In a similar vein, Participant 5 confirmed the exercises' usefulness, highlighting the significance of developing applied skills. Together, all the responses indicate that laboratory-based training for forensic training promotes meaningful, competency-oriented learning by strengthening conceptual understanding and bridging theory and practice. These are their answers:

“I realized that hands-on activities make learning easier and more meaningful than reading theory alone.” (P7)

“The laboratory was very meaningful because I realized the activities' usefulness in verifying actual incidents.” (P14)

“These activities provided valuable practical learning.” (P5)

The findings indicate that forensic training in a lab greatly improved students' technical proficiency, engagement, and preparedness for practical use (Yankson 2025). Participants said that while planned activities improved procedural accuracy in handling evidence and collecting fingerprints, exposure to real fingerprint testing techniques boosted interest and reaffirmed the forensic tasks' professional significance. A thorough and multidisciplinary learning experience was proven by the range of laboratory exercises, which included everything from fingerprint analysis and paraffin testing to forgery detection, money authentication, and chemical investigations. The results additionally demonstrate a shift from initial unfamiliarity to active and meaningful involvement as students overcame procedural obstacles, gained a core understanding of biometrics, and continued to enjoy the activity despite its complexity. Anchored on Experiential Learning Theory, the responses demonstrate that confidence and competence in forensic tasks were strengthened through direct engagement with structured, hands-on laboratory activities. Experiential Learning Theory posits that learning occurs through a cyclical process of concrete experience, reflective observation, abstract conceptualization, and active experimentation, particularly in skill-intensive disciplines (Kolb and Kolb, 2023). Clear procedures and step-by-step instructional guidance supported effective engagement in complex tasks such as evidence packing and paraffin testing, enabling learners to translate instruction into accurate performance. Although initial laboratory exposure was perceived as overwhelming, the challenge contributed positively to learning by stimulating reflection and sustained engagement when supported by guidance. Practical experiences in fingerprint identification, footprint collection, signature examination, and microscopic analysis of ballistic and handwriting evidence facilitated deeper understanding than theory alone, illustrating how concrete experiences enhance conceptual clarity and procedural mastery. Recent educational research confirms that experiential, guided laboratory instruction promotes confidence, skill retention,

and meaningful learning by allowing learners to actively construct knowledge through authentic practice while progressively managing task complexity (Cant and Cooper, 2024). These implies that laboratory-centered, competency-based training paradigms that emphasize real-world, technique-driven activities and multidisciplinary task integration should be institutionalized in forensic education programs. While exposure to real-world forensic applications should be purposefully incorporated to promote professional identity building and job relevance, structured procedural exercises must continue to be a key component of curriculum design in order to guarantee technical precision in evidence management. Further evidence of the requirement for scaffolded education that helps students navigate procedural complexity without losing motivation comes from the recorded shift from unfamiliarity to active participation (Maftuna 2025).

3.2. Building Confidence while Navigating Challenges and Uncertainties in Evidence Handling

The participants' responses consistently indicate that clarity and structure in laboratory procedures were central to building their confidence in evidence handling. Participant 1 and 11, expressed that confidence was highest when the procedures for packing evidence and performing fingerprint dusting and lifting were clear, systematic, and easy to follow, suggesting that well-defined, step-by-step instruction reduced uncertainty and procedural error (Franco et al. 2025). Similarly, Participant 12 highlighted that confidence gained from hands-on practice in proper evidence packaging, particularly in preventing contamination through the correct placement, sealing, and labeling of items such as mobile phones. Collectively, these accounts demonstrate that structured procedural guidance combined with practical application enhances students' assurance in performing forensic tasks (Li et al. 2025). It allows them to internalize correct protocols, understand the rationale behind each step, and apply evidence-handling standards with greater accuracy and consistency. These are their answers:

"I felt most confident during the practice of packing evidence because the procedure was clear and easy to follow." (P1)

"I felt most confident when we practiced fingerprint dusting and lifting because the steps were systematic and clear." (P11)

"I felt the most confident when we practiced packaging evidence such as when we placed a cellphone in a carton to prevent contamination. we were taught how to properly seal and label the evidence." (P12)

Additionally, the critical role of instructor guidance and collaborative learning in facilitating skill acquisition and learner confidence during laboratory activities, as noted by Participant 2, step-by-step instruction from the laboratory teacher provided clear direction, enabling students to perform procedures correctly and with greater assurance (Madybekova et al. 2026). This instructional support was complemented by the emphasis on teamwork, as expressed by Participant 4, where shared responsibility and cooperative task performance not only enhanced engagement but also made the learning process more enjoyable and meaningful. Meanwhile, Participant 8 highlighted that even when students encounter conceptual difficulties such as identifying different types of firearms continuous instructor guidance serves as an effective scaffold, allowing them to manage complex tasks despite initial confusion. Overall, a supportive learning environment that fosters comprehension, lessens cognitive load, and

boosts students' confidence in managing technically challenging forensic and criminological laboratory tasks is produced by combining structured instructor facilitation with collaborative practice. These are their answers:

“Our laboratory teacher guided us step-by-step on how to do it properly.” (P2)

“Our group practiced teamwork, and we enjoyed performing the assigned tasks.” (P4)

“Although I get confused about identifying different types of firearms, I can still manage with the guidance of our instructor.” (P8)

Moreover, Participant 1, articulated that during chemical-based latent fingerprint development, uncertainty was created by a concern of making mistakes or contaminating samples, underscoring the perceived danger and accuracy required by such techniques. Similarly, Participant 2 expressed that making repeated mistakes when taking fingerprints highlights the trial-and-error nature of intricate laboratory procedures, which can momentarily erode confidence especially when accurate findings are not obtained right away. Participant 5 further emphasized this challenge by expressing limited familiarity with chemical mixture testing, noting that it requires a deeper conceptual understanding beyond procedural execution. Collectively, these responses suggest that insufficient mastery of underlying chemical principles and limited practice opportunities contribute to hesitation and lower self-assurance (Niyoturamya 2025). These are their answers:

“I felt least confident when using some chemicals for latent fingerprint development because I was afraid of making mistakes or contaminating the samples.” (P1)

“I made several errors and had to repeat the process three times before getting the correct result. when working on fingerprint sampling.” (P2)

“I am not very familiar with chemical mixture testing, as it requires deeper understanding.” (P5)

The findings indicate that the main factors bolstering students' confidence in handling evidence are precise, methodical, and well-organized laboratory procedures backed by practical experience and diligent instructor supervision. Participation and confidence in carrying out forensic tasks were further improved by collaborative learning. However, pupils' confidence declined with chemically difficult processes, especially when they lacked adequate practice or a better conceptual grasp (Agravante-Destacamento 2025). In general, students' confidence in forensic laboratory work was developed and maintained through organized education, real-world application, and ongoing supervision. This is anchored to Bandura's Self-Efficacy Theory, which emphasizes that individuals' beliefs in their capabilities are shaped by mastery experiences, vicarious learning, verbal persuasion, and emotional states (Bandura 2023). Students reported heightened confidence when performing forensic tasks that were structured, clearly demonstrated, and guided step-by-step, such as evidence packing, paraffin testing, and fingerprint dusting and lifting, reflecting mastery experiences that reinforce self-efficacy. Conversely, lower confidence emerged in tasks requiring high precision and technical knowledge, such as ballistics analysis, chemical processing, and examination of gunpowder residue, where the perceived risk of errors and contamination increased anxiety, highlighting the role of emotional states in self-efficacy development. Instructor guidance, collaborative teamwork, and supportive supervision helped mitigate these uncertainties, serving as forms of verbal persuasion and

vicarious learning that enabled students to navigate complex procedures successfully. This pattern indicates that confidence in forensic education is dynamically built through experiential practice under structured guidance, allowing students to manage both technical challenges and the psychological pressures inherent in evidence handling (Hamblin, B. 2025). This implies that highly structured, protocol-driven teaching frameworks along with frequent practical application and ongoing instructor supervision should be given top priority in forensic laboratory instruction (González-del-Castillo and Barbero-Alcocer 2025). To keep students from losing confidence in difficult tasks, curriculum designers should not only prioritize procedural sequencing but also purposefully improve their conceptual grasp of chemically intensive approaches. The findings also point to the need for collaborative laboratory models to be institutionalized in order to improve participation and shared cognitive processing. In order to methodically increase and maintain students' confidence in handling evidence, forensic education programs should generally use a scaffolded, competency-based approach that incorporates theoretical depth, intentional practice, and guided feedback.

3.3. Experiencing Resource Constraints Hindering Hands-On Mastery of Evidence Handling

The participants demonstrate how their learning experience was greatly impacted by time and laboratory resource limitations. Participant 1, stressed that complete participation was restricted because of the short lab session and the limited equipment availability, which made it impossible to accommodate everyone. Participant 2 emphasized that sharing limited equipment made it difficult to finish exercises on time, which affected skill practice. Participant 6 observed that it was challenging to practice effectively within the allocated time due to a combination of a strong class load and limited laboratory resources. These responses collectively indicated that limited resources and time constraints can hinder practical experience, diminish chances for skill development, and restrict the overall efficacy of training in forensic laboratories (Parmar and Rathod 2026). These are their answers:

“I encountered Limited availability of equipment and the short time allocated for the subject not everyone could be accommodated during the lab period.” (P1)

“Sharing limited equipment prevented me from completing the exercises on time.” (P2)

“Challenges included limited laboratory resources, combined with a heavy lesson load, which made it difficult to practice adequately within the available time.” (P6)

Additionally, high student-to-equipment ratios and a lack of laboratory resources made it difficult to complete practical tasks (Ghandi and Deghilipulu 2025). Participant 11 stressed that the combination of numerous pupils and limited equipment made carrying out activities difficult, Participant 1 noted that the huge class size prohibited all students from being fully accommodated during the lab period. Additionally, Participant 4 pointed out that due to equipment and time limitations, certain exercises were left undone. The responses collectively indicate that limited lab time and insufficient student-to-resource ratios can hinder experiential learning, restrict skill mastery, and lower the standard of forensic laboratory training. These are their answers:

“Too many students in class, not everyone could be accommodated during the lab period.” (P1)

“Laboratory activities were difficult due to the high number of students and limited equipment.” (P11)

“Due to limited time and equipment, some tasks could not be fully completed during the lab session some activities were left unfinished.” (P4)

Moreover, Limited practice opportunities and inadequate lab equipment had a detrimental impact on procedural mastery and skill retention. According to Participant 2, the lack of equipment hindered frequent practice, which eventually caused the steps to be forgotten. While Participant 14 stressed that a lack of instruments prevented complete comprehension and hands-on involvement with evidence examination. Participant 8 pointed out that hurrying through tasks resulted in failures in recollection methods. These responses collectively indicate that insufficient practice time and resources can hinder the development of proficiency in forensic laboratory abilities, undermine procedural confidence, and jeopardize learning continuity (Jamil et al. 2025). These are their answers:

“Due to the insufficient equipment, I could not practice repeatedly, and over time, I forgot the procedures.” (P2)

“Because of limited tools and equipment, I could not fully understand or practice the examination of evidence.” (P14)

“I often forgot steps, especially when rushing through activities.” (P8)

The results show that learning and skill development in forensic laboratory training were severely impacted by time restrictions, a lack of laboratory resources, and high student-to-equipment ratios. Lack of equipment and brief lab sessions limited opportunities for repeated practice by impeding timely completion of exercises and preventing complete participation. Effective practice was difficult due to a full class load and inadequate resources, and some activities were left undone as a result. Furthermore, insufficient equipment availability and hurried work had a detrimental effect on procedural memory, understanding, and practical experience with evidence analysis. These findings show that inadequate funding, crowding, and practice time limit experiential learning, diminish skill mastery, and undermine procedural confidence, ultimately reducing the overall efficacy of forensic laboratory training (Swargiary 2025). The experiences described reflect how resource-constrained laboratory conditions significantly hindered students' ability to acquire hands-on mastery in evidence handling, consistent with Kolb's Experiential Learning Theory, which emphasizes that learning occurs most effectively when learners engage in a cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation (Pole and McGee 2026). Limited availability of equipment, reagents, and laboratory space prevented full participation in scheduled sessions, forced sharing of scarce materials, and restricted opportunities for repeated practice, thereby interrupting the experiential learning cycle. Time constraints and heavy lesson loads further impeded students' ability to complete activities, reflect on procedures, and consolidate skills, resulting in gaps in procedural understanding and reduced confidence in handling evidence. Classroom overcrowding compounded these challenges, diminishing opportunities for individualized guidance and collaborative problem-solving, which are key elements in Kolb's framework for reinforcing experiential learning through active engagement and reflection. Research in forensic and science education underscores that insufficient laboratory resources and limited hands-on practice compromise the development of practical competencies and procedural mastery, demonstrating that adequate material and temporal support are critical to completing the full experiential learning cycle. Addressing these systemic constraints is therefore essential to facilitate meaningful experiential learning, enabling students to

translate theoretical knowledge into practical skill, build confidence, and achieve competency in forensic evidence handling. These implies that in order to improve learning outcomes, forensic education programs should place a high priority on having enough laboratory resources, suitable student-to-equipment ratios, and lengthy, well-organized lab sessions. Students could participate in repeated hands-on exercises, improve their technical proficiency, and increase their procedural memory by having enough equipment and practice time. Furthermore, controlling class sizes and workload can limit hurried performance and prevent incomplete tasks, promoting more efficient skill development. All things considered, increasing experience learning, fostering procedural confidence, and enhancing the general caliber and effectiveness of forensic training require resource investment and laboratory scheduling optimization (Nordin et al. 2025).

3.4. Facing Technical Complexity and Psychological Pressures Undermining Confidence

Learning was severely hampered by technical complexity and a lack of familiarity with laboratory apparatus. Participant 1 pointed out that it was challenging to grasp how to use the equipment right away, emphasizing the necessity of guided teaching and incremental skill building. Participant 5 emphasized that chemical mixture experiments were particularly challenging and required additional study to achieve competence. Similar, Participant 9 clarified that in order to properly use laboratory equipment for jobs like fingerprint collection, previous knowledge and preparation were necessary because a lack of familiarity made the operations challenging to carry out. Collectively indicate that in order to develop competence and confidence in using specialized equipment, learning forensic laboratory procedures necessitates both theoretical preparation and hands-on instruction (Sturz et al. 2026). These are their answers:

“Sometimes it was hard to understand how to operate the equipment immediately.” (P1)

“Chemical mixture experiments were challenging and required further study.” (P5)

“One challenge was learning to use laboratory equipment properly. Proper study and preparation were necessary before performing fingerprint collection, otherwise the task was difficult.” (P9)

The challenges they faced in forensic lab work had a big impact on their confidence when handling evidence. Participant 7 highlighted the high stakes involved with procedural precision by expressing a worry of making mistakes that could jeopardize the integrity of the evidence. Participant 9 pointed out that a lack of practical experience made it challenging to retain the attentive attention and confidence essential for proper evidence collecting, while Participant 1 expressed concern about perhaps mishandling evidence in actual instances as a result of inadequate practice. These responses show that insufficient practice opportunities and early procedural challenges might erode learners' confidence, highlighting the necessity of organized instruction and regular hands-on practice to develop proficiency and confidence in forensic tasks (Rabina et al. 2025). These are their answers:

“Challenges initially affected my confidence because I was afraid of making mistakes that could compromise evidence integrity.” (P7)

“I worried that in a real case, I might mishandle the evidence if I don't get enough practice.” (P1)

“Challenges affected me because collecting and gathering evidence requires careful attention and confidence which was difficult to maintain with limited hands-on experience.” (P9)

Their trust in carrying out forensic processes was significantly impacted by the lack of adequate laboratory equipment. Participant 6 stressed that having limited access to equipment brought attention to their inexperience and made it more challenging for them to complete tasks accurately. Participant 13 highlighted how their lack of resources made them doubt the veracity of their acts and made them feel unprepared for forensic situations in the real world. Similarly, Participant 14 pointed out that a lack of tools made it difficult to fully understand and interact practically with the study of the evidence, which decreased trust in reporting findings and preparedness for actual investigations. The responses indicated the need of having sufficient access to equipment in order to develop procedural competence, boost self-esteem, and get students ready for professional forensic work (Eltrass et al. 2026). These are their answers:

“The lack of equipment significantly affected my confidence, as I realized my limited experience made performing procedures correctly more difficult.” (P6)

“The lack of equipment eroded my confidence, as I often doubted whether my actions were correct. This uncertainty made me feel unprepared for real-life forensic scenarios.” (P13)

“Because of limited tools and equipment, I could not fully understand or practice the examination of evidence. This reduced my confidence in reporting findings to an instructor and made me feel unprepared for real-life investigations, as I lacked hands-on experience with all procedures.” (P14)

The results shows that the technical difficulty of the tasks, the lack of hands-on experience, and the limited availability of laboratory equipment had a significant impact on students' learning and confidence in forensic laboratory operations (Wu and Du 2026). In addition to stressing that chemical mixture experiments and fingerprint collection required prior study, planning, and supervised training to acquire competency, participants reported difficulty instantly grasping how to operate equipment. Due to these technological difficulties and the lack of practice, students' confidence was severely impacted. They voiced worry about handling evidence incorrectly in real-world situations and a fear of making mistakes that could jeopardize its integrity. Furthermore, students felt unprepared for real-world investigations due to limited access to laboratory resources, which increased uncertainty, decreased procedural expertise, and limited involvement with evidence processing. Self-efficacy, a key idea in Bandura's Social Cognitive Theory, provides an effective explanation of the difficulties faced by students undergoing forensic laboratory training (Bandura 2023). Self-efficacy, which is a learner's confidence in their capacity to complete particular tasks, is impacted by verbal encouragement, mastery experiences, observational learning, and emotional state management (Hani 2026). The high technical demands of forensic education, such as using specialized equipment, conducting experiments with chemical mixtures, and taking precise fingerprints, along with the high stakes and lack of familiarity, had a detrimental effect on students' perceived self-efficacy. Participants stated that uncertainty, reluctance, and diminished confidence were caused by procedural complexity, concern of tainting evidence, and inadequate practice. Opportunities for repeated mastery experiences, which are essential for boosting competence and confidence, were further limited by limited equipment access. These mastery experiences

are the most potent source of self-efficacy, according to Social Cognitive Theory; without them, students find it difficult to internalize knowledge and feel unprepared for practical application (Al-Thani and Ahmad 2025). As a result, systematic instruction, gradual skill development, frequent practical experience, and adequate lab supplies are crucial scaffolds that boost self-efficacy and help students overcome technical difficulties, lower their anxiety levels, and gain competence and confidence in carrying out forensic procedures. These implies that in order to improve technical proficiency and learner confidence, forensic education programs should place a high priority on offering adequate laboratory facilities, organized instruction, and frequent hands-on practice (Abzhaparova and Murphy 2026). Students can be assisted in navigating complex processes like chemical analysis and fingerprint collecting by having access to sufficient equipment and implementing guided, step-by-step education. Furthermore, incorporating scaffolded practice and preparatory study into the curriculum can lower anxiety, improve procedural competence, and better prepare students for forensic situations in the real world. Funding materials, organized instruction, and intentional practice are necessary to produce forensic professionals who are competent, self-assured, and prepared for the field.

3.5. Developing Ethical Awareness and Procedural Accuracy Through Guided Forensic Instruction

Forensic training benefited greatly from laboratory instruction and appropriate equipment, which promoted both procedural precision and ethical awareness (Al-Matrouk, et al. 2026). Participant 7 expressed that the instructor supervision reinforced the ethical aspects of managing evidence by emphasizing the value of honesty, integrity, and following rules. Participant 12 stressed that the regular reminders about correct labeling, documenting, and upholding the chain of custody improved knowledge of professional obligations. Participant 10 emphasized the significance of personal protective measures and cautious handling of possible evidence, showing how practical training fosters both moral behavior and procedural rigor. The responses pointed to the importance of both practical experience and organized laboratory supervision in helping students improve their ethical awareness and technical proficiency in forensic practice. These are their answers:

“Laboratory instruction and equipment greatly helped me develop ethical awareness and procedural accuracy. Instructors emphasized honesty, integrity, and respect for guidelines, showing that ethical behavior is crucial in evidence handling.” (P7)

“Instructors consistently reminded us about proper labeling, documentation, and chain of custody... helping me understand the ethical responsibilities of handling evidence.” (P12)

“They reminded us to always wear gloves and treat everything at a crime scene as potential evidence.” (P10)

Additionally, their comprehension of procedural precision in evidence handling was much improved by the assistance of their instructors as well as by the availability of adequate laboratory facilities and equipment. Participant 6 emphasized that knowing the detailed steps for processing evidence was made easier by the instructor's assistance and the materials that were readily available. While Participant 11 pointed out that comprehensive support and unambiguous explanations from instructors enhanced understanding and execution, Participant 9 emphasized that consistent instruction on appropriate collection technique reinforce correct procedural processes.

The responses pointed to the necessity of structured instruction combined with useful lab tools for fostering students' technical competence and self-assurance in forensic work (Evans 2026). These are their answers:

“Laboratory instructor, facilities and equipment helped me understand the step-by-step procedures for processing evidence.” (P6)

“Our instructors consistently taught how to collect evidence properly and explained the correct procedures.” (P9)

“Our instructor assisted us thoroughly and provided clear explanations.” (P11)

The results show that, with the help of organized instructor direction and the provision of suitable facilities and equipment, forensic laboratory training greatly improved both procedural accuracy and ethical awareness (Elkins et al. 2025). Supervision reinforced the ethical obligations that come with managing evidence by emphasizing honesty, integrity, and following rules. Understanding of professional responsibilities was further reinforced by frequent reminders on appropriate labeling, documentation, chain of custody, and personal protective measures. Additionally, students were able to gain technical skill and confidence by better understanding and executing evidence processing processes thanks to the combination of explicit, step-by-step training and access to functioning laboratory resources. It demonstrates that developing both moral behavior and procedural competence in forensic practice requires hands-on training backed by structured laboratory instruction and adequate resources. This can be effectively explained through Situated Learning Theory, which emphasize the role of guided practice, modeling, and contextualized instruction in shaping professional behavior and competence. Guided forensic instruction, where instructors consistently model ethical conduct and reinforce correct procedures, provides learners with direct mastery and vicarious learning experiences that strengthen both ethical awareness and procedural accuracy (Parmar and Rathod 2026). Repeated emphasis on proper labeling, documentation, chain of custody, use of personal protective equipment, and step-by-step evidence processing reinforces ethical norms while embedding accuracy into routine practice, demonstrating that ethical behavior is inseparable from technical competence in forensic work. Situated Learning Theory further explains that learning ethics and procedures within authentic laboratory contexts allows learners to internalize professional standards as part of legitimate forensic practice rather than abstract rules (Khan and Ullah 2026). Recent studies in forensic and professional education confirm that instructor-guided demonstrations, immediate feedback, and consistent reinforcement of ethical standards significantly improve procedural compliance, reduce errors, and cultivate professional responsibility in evidence handling (Pellas 2026). Thus, guided forensic instruction plays a critical role in shaping ethically grounded practitioners who are capable of accurate, responsible, and defensible evidence handling.

These imply that planned, practical laboratory training backed by capable instructor supervision and sufficient facilities and equipment should be given top priority in forensic education programs (Nilendu 2024). Explicit, step-by-step training combined with hands-on experience can improve procedural accuracy and ethical awareness, guaranteeing that students grasp their professional obligations while gaining technical proficiency. Teachers can build students' confidence, promote adherence to ethical principles, and effectively prepare them for real-world forensic practice by offering adequate materials and well-organized instruction.

4. Results and Discussions

This study examined how criminology students' confidence in handling evidence is affected by their experiences in forensic science courses. The participants consisted of 14 Bachelor of Science in Criminology students (8 males and 6 females) aged 20–24. The study explored how these events influence students' academic progress, personal development, and career goals through interview-based data collecting. The results are intended to offer insights that can improve forensic science education and better prepare students for the professional needs of evidence management for educators, legislators, and academic institutions. This study categorizes the students' lived experiences into five interconnected themes that collectively elucidate how exposure to forensic laboratories influences criminology students' confidence in evidence handling. Acquiring Immersive Skill Through Realistic Forensic Experiences, Building Confidence while Navigating Challenges and Uncertainties in Evidence Handling, Experiencing Resource Constraints Hindering Hands-On Mastery of Evidence Handling, Facing Technical Complexity and Psychological Pressures Undermining Confidence, and Developing Ethical Awareness and Procedural Accuracy Through Guided Forensic Instruction. These themes collectively offer a comprehensive perspective on how experiential learning environments both challenge and enhance students' proficiency and self-assurance in managing forensic evidence.

5. Conclusions

Based on the findings of the study, the following conclusions are drawn: First, immersive and realistic forensic experiences play a critical role in strengthening students' ability to translate theoretical knowledge into competent evidence-handling practice, thereby enhancing critical thinking, procedural precision, and professional confidence. Second, exposure to complex and high-stakes evidence-handling tasks in a controlled learning environment fosters students' confidence and cultivates adaptive problem-solving skills through experiential learning. Third, resource constraints, including limited laboratory equipment, materials, and practice time, significantly hinder students' ability to repeatedly apply forensic procedures, thereby undermining their confidence and technical competence. Additionally, technical complexity and psychological pressures, such as high-detail tasks and fear of errors, can significantly undermine students' confidence, impeding both skill acquisition and effective decision-making in forensic practice. Lastly, guided forensic instruction, paired with hands-on practice, effectively cultivates students' ethical awareness and procedural accuracy, ensuring proper documentation, chain-of-custody adherence, and compliance with professional standards. Based on these conclusions, the study recommends the following future actions: 1) Implement scaffolded instructional designs that gradually increase procedural complexity to support confidence building; 2) Invest in laboratory resources, including updated equipment and sufficient materials, to facilitate repeated hands-on practice; 3) Develop faculty training programs to strengthen instructor guidance and mentorship in forensic procedures; 4) Incorporate simulation-based exercises and virtual technologies to provide safe, risk-free practice of complex investigative tasks; 5) Conduct longitudinal studies to assess the long-term impact of immersive forensic training on professional competence; and 6) Explore interventions that reduce psychological stress during high-stakes practical exercises, promoting resilience and adaptive problem-solving among students.

6. Recommendations

The following recommendations are hereby put forward: First, criminology and forensic science courses continue to integrate realistic, hands-on simulations and crime scene exercises, expanding immersive learning opportunities will further bridge the gap between theory and practice, enhancing critical thinking, technical precision, and confidence in evidence handling. Second, instructors may design controlled, high-stakes tasks that progressively challenge students while providing guidance and feedback, this will help learners develop adaptive problem-solving skills, resilience, and self-assurance in managing complex forensic scenarios. Third, Institutions may prioritize adequate laboratory resources, including equipment, materials, and extended time practice sessions. Additionally, forensic education programs may incorporate supportive instruction, gradual skill scaffolding, and stress-management strategies to help students build competence, resilience, and confidence under challenging conditions. Furthermore, forensic programs may continue to emphasize structured mentorship and supervised laboratory experiences to strengthen students' ethical judgment, procedural discipline, and readiness for credible professional practice. Lastly, Future researcher may explore the perspectives of instructors, laboratory technicians, and forensic practitioners to triangulate student experiences and provide a more comprehensive understanding of instructional effectiveness.

Declarations

Source of Funding

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Competing Interests Statement

The authors have not declared any conflict of interest.

Consent for publication

The authors declare that they consented to the publication of this study.

Authors' Contributions

Both the authors conceptualized the study, conducted the interviews, performed data analysis, and prepared the manuscript.

Informed Consent

Informed consent was obtained from all participants prior to data collection.

Availability of Data and Material

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

Institutional Review Board Statement

Not Applicable.

Ethical Approval

Ethical approval for this study was obtained from the appropriate institutional ethics committee.

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Declaration of Artificial Intelligence

No AI tools were used in the preparation or writing of this manuscript.

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