

FORENSIC SCIENCE EDUCATION AN EMERGING FIELD TO DEVELOP SKILLS FOR IDENTIFYING CRIMES

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Submitted September 7, 2024; Revised December 10, 2024; Accepted December 20, 2024; Published March 20, 2025

ABSTRACT

This research paper explores forensic science education an emerging field to develop skills for identifying crimes in Pakistan. It examines the importance of forensic science education in the country and evaluates the potential benefits of integrating this course into the legal education system. The paper also provides a brief overview of the institutions that offer forensic services in Pakistan. Additionally, it analyzes the challenges that may arise during the implementation of this initiative and proposes solutions to address them. The discussion includes the influence of forensic science education on the developing skills of students. The findings indicate that incorporating forensic science into legal education programs in Pakistan could significantly impact legal education, legal practice, and the administration of justice in Pakistan.

Keywords: Forensic education, Emerging field, Developing skills, Crimes identification

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INTRODUCTION

Forensic science plays a vital role in today's legal system. The use of forensic evidence in legal proceedings has become increasingly common [1], and lawyers are expected to possess a fundamental understanding of this evidence and its applications in the courtroom [2]. However, in Pakistan, forensic science education is still developing, and there is insufficient emphasis on the significance of forensic evidence within legal education. This research paper aims to examine the impact of introducing forensic science as a compulsory course in Pakistan's legal education. Notably, no specific research has been conducted on this topic in relation to Pakistan, making this study a pioneering effort.

As the legal profession evolves and the demand for competent lawyers increases, it is crucial to explore new avenues for integration into legal education. While forensic science is not a new concept, its relevance has expanded significantly due to advancements in the modern and digital age [3]. This study seeks to highlight the potential benefits and implications of incorporating forensic science into the legal curriculum. Additionally, it aims to enhance legal education and develop well-rounded lawyers who possess the necessary forensic skills to navigate the complexities of the legal field in Pakistan.

Forensic science encompasses the skills, knowledge, and techniques used to collect, preserve, examine, analyze, and interpret



evidence related to criminal cases or civil disputes, assisting lawyers, judges, and law enforcement agencies [4-7].

The term "forensic" has been part of the English language since 1650 and derives from the Latin word "forensic," meaning public, forum, discussion, or assembly. Trials in ancient times were conducted publicly [8], which is reflected in the modern definition of forensic as relating to discussions or debates used in court settings. Historically, the roots of forensic can be traced back to ancient Rome, where presenting a criminal charge involved bringing the case before a public assembly. During this period, both the accused and the accuser would deliver speeches outlining their respective versions of events. The outcome of the case was determined by the strength of their arguments and the persuasive nature of their presentations. Typically, the individual who made the most compelling case was declared the victor in the proceedings. In the past, standardized forensic methods were lacking, making it easier for wrongdoers to evade justice. Trials and investigations largely depended on coerced confessions and witness testimonies. Nevertheless, some ancient sources hint at principles and methods that foreshadow the forensic science practices that developed later [9]. Today, forensic science encompasses a diverse array of specialized techniques, including fingerprint analysis, DNA analysis, toxicology, ballistics, and digital forensics.

Forensic scientists and investigators employ these techniques to evaluate physical evidence, reconstruct crime scenes, and provide expert testimony in both criminal and civil trials. The use of forensic science is crucial in criminal investigations and legal proceedings, as it can yield vital evidence to help identify suspects, establish timelines, and determine guilt or innocence [10].

Practitioners in forensic science require extensive training, education, and experience. Many forensic scientists and

investigators come from backgrounds in fields such as biology, chemistry, physics, accounting, or computing, and they receive further training in forensic techniques and procedures. The development and advancement of forensic science is an ongoing endeavor, continually evolving as new techniques and methodologies are established and refined to improve the accuracy and reliability of forensic analyses.

PAKISTANI INSTITUTIONS DEALING WITH FORENSIC SCIENCE

Forensic science is often seen as a cornerstone of modern identification, investigation, and conviction practices. While individuals may attempt to conceal the truth, fabricate alibis, or forget critical details in court, physical evidence remains a steadfast witness. Skilled forensic scientists have the knowledge and expertise to interpret this silent evidence, bringing it to life in legal proceedings [11-14].

Forensic facilities play a vital role in our justice system. Forensic scientists provide essential services and expert opinions across a range of disciplines, supporting civil and criminal investigations through meticulous examination of physical evidence [15].

These experts, who are dedicated to the greatest standards of objectivity, science, and honesty, assist in voicing the unheard witness of the evidence and significantly improve the legal system.

In Pakistan, several institutions are dedicated to forensic science, including:

National Forensic Science Agency (NFSA)

A government agency that delivers forensic services to law enforcement, courts, and other government bodies in Pakistan. NFSA offers a variety of services, such as crime scene investigation, DNA analysis, and drug testing.

Punjab Forensic Science Agency (PFSA)

This provincial agency provides forensic services to law enforcement in Punjab. Established under the Punjab Forensic

Science Agency Act in 2007, PFSA operates 14 advanced forensic laboratories. Numerous investigations, including those involving DNA and serology, latent fingerprints, drugs, polygraph testing, toxicology, forensic biology, forensic chemistry, digital forensics, and document analysis, can be handled by these institutes.

Sindh Forensic Science Agency (SFSA)

Enacted in August 2017, the SFSA oversees Sindh's first and the country's second Forensic DNA and Serology Laboratory (SFDL). This state-of-the-art facility supports Molecular Medicine and Drug Research, providing comprehensive DNA and serology services. It assists law enforcement agencies, including police and prosecution departments, in utilizing modern technology to detect and identify DNA and human biological fluids from crime scenes.

KPK Forensic Science Agency

Established under the KPK Forensic Science Agency Act of 2000, this agency in Khyber Pakhtunkhwa (KPK) assists investigation officers in examining forensic evidence for civil and criminal cases. It supports the collection of evidence for ongoing cases in provincial courts and conducts thorough analysis of documents related to civil and criminal activities, as well as of equipment and materials recovered from crime scenes.

Baluchistan Forensic Science Laboratory

Located in Quetta, Baluchistan, this laboratory provides forensic services to law enforcement agencies throughout the province. It has examined approximately 4,000 cases of various types, including narcotics and biological specimens, collaborating with agencies such as the Anti-Narcotics Force, Pakistan Customs, Excise and Taxation, Baluchistan Levies, Anti-Smuggling Agency, Regional Ehtesab Bureau, Pakistan Railway Police, Anti-Corruption, Federal Investigation Agency, and several courts in Baluchistan.

Centre for Applied Molecular Biology (CAMB)

Affiliated with the University of Punjab,

CAMB is a research institute that specializes in molecular biology research and forensic analysis. It offers DNA analysis and other forensic services to law enforcement agencies, courts, and other clients.

Forensic Science Laboratories

Numerous forensic science laboratories operate across Pakistan, with facilities in Lahore, Karachi, and Islamabad. These laboratories deliver forensic analysis services to law enforcement and the judiciary, encompassing DNA analysis, drug testing, and ballistics analysis.

Institute of Forensic Sciences (IFS)

A private institution in Islamabad, IFS offers education and training in forensic science to students and professionals. The institute provides courses in various disciplines, including crime scene investigation, forensic anthropology, and digital forensics.

These institutions are vital in providing forensic services and training in Pakistan and also create opportunities for research and collaboration in the field of forensic studies.

EDUCATION EMERGENCE

Forensic science has become increasingly significant in legal education, particularly in countries like Pakistan, where the justice system heavily relies on forensic evidence. It plays a vital role in the investigation and resolution of legal proceedings. Incorporating forensic science into legal education can equip law students with the necessary knowledge and skills to effectively navigate the legal system and evaluate and challenge forensic evidence in court. This literature review examines scholarly views on the importance of teaching forensic science to law students, highlighting a growing consensus among legal professionals and academics that including forensic science in legal education benefits both law students and the legal profession as a whole.

Understanding Forensic Evidence

Law students must grasp the nature and limitations of forensic evidence in order to

evaluate it effectively. This involves learning about the different types of forensic evidence, methods of collection and analysis, and potential errors or misinterpretations that can occur. Research indicates that a lack of understanding of forensic evidence among legal professionals can result in prolonged and costly court proceedings. By providing law students with essential forensic knowledge and skills, legal processes can be streamlined, leading to a more efficient and effective justice system. Teaching forensic science prepares the next generation of legal professionals for the demands of modern legal practice [16].

Improving Communication and Advocacy Skills

Forensic skills training enhances students' ability to communicate vividly and persuasively with judges, lawyers, litigants, and officials regarding forensic knowledge. This training also fosters the development of advocacy skills, enabling students to present compelling arguments and strengthen their overall legal practice.

Advancements in Science and Technology

Rapid advancements in science and technology have significantly impacted the legal landscape. The digital age has introduced new challenges, including cybercrime and the handling of digital evidence [17]. From DNA analysis to digital forensics, the application of forensic science in legal proceedings has become increasingly important. Teaching forensic science enables law students to understand the scientific principles underlying various techniques, equipping them to navigate cases that involve complex scientific data and adapt to technological advancements in handling digital information.

Enhancing Critical Thinking and Problem-Solving Skills

Forensic science education fosters critical thinking skills among law students [18], allowing them to approach legal problems with a more analytical mindset. Forensic analysis often requires careful examination

of data and statistics, enabling students trained in these methods to develop a systematic and logical approach to critical thinking and problem-solving.

Refining Legal Practice

Teaching forensic science equips law students with vital skills that ultimately enhance their legal practice. By incorporating forensic science into legal education, law students can develop a deeper understanding of its application in legal practice. This knowledge enhances their ability to advocate for clients in cases involving forensic evidence and improves their skills in presenting cases effectively in court. Students learn to prepare and present forensic reports and visual aids, which can clarify and strengthen their arguments. By refining their oral, written, and communication skills in a forensic context, they become more persuasive advocates, better equipped to present their cases convincingly to judges, juries, and opposing counsel.

Expertise in Criminal Cases

Like many countries, Pakistan faces challenges related to criminal activities. By integrating forensic science into legal education, graduates acquire specialized skills [19] such as crime scene analysis and forensic investigation. This expertise positions them well for roles in law enforcement agencies, prosecution departments, and criminal defense firms.

Enhancing Investigative Capabilities

Lawyers trained in forensic skills are better prepared to conduct field investigations [20]. With a solid understanding of forensic techniques and procedures, they can effectively collaborate with investigators, identify critical factors, and analyze evidence critically. This enhances their ability to build strong cases and contribute to efficient investigations, making them valuable assets to law enforcement agencies, investigative bodies, and legal firms engaged in criminal law. Employers often seek candidates with investigative expertise, and graduates with forensic training can meet this demand.

Effective Evidence Gathering

Forensic training equips lawyers with the skills to collect evidence in a legally admissible and scientifically sound manner [21]. They learn to prepare case files, establish a chain of custody, and implement preservation methods to ensure the integrity of evidence. Lawyers with forensic expertise are adept at identifying potential evidence sources, interviewing witnesses, and collaborating with investigators to gather pertinent information. This enables them to build stronger cases based on solid evidence, thereby increasing their effectiveness in court.

Presenting Complex Evidence

Forensic science allows lawyers to present complex scientific evidence in a more accessible and persuasive way [22]. They learn to simplify technical concepts, presenting evidence clearly, concisely, and compellingly during trials. Lawyers with forensic training can effectively use visual aids, demonstrative evidence, and expert testimony to help judges and juries grasp the significance of the evidence and its relevance to the case.

TEACHING OF FORENSIC SCIENCE IN OTHER COUNTRIES

Forensic science is increasingly integrated into legal education across many countries worldwide. These courses are typically available through forensic science programs or departments within universities, providing students with a multidisciplinary education that merges scientific and legal perspectives. Here are a few examples of countries where forensic science is taught at both undergraduate and postgraduate levels:

In the United States, an older estimate indicated that 120 institutions offered courses in forensic science, covering topics such as DNA analysis, fingerprint analysis, and digital forensics. More recent data from 2019-2020 shows that 43 forensic science courses were available solely in law schools [23]. Additionally, some law schools provide joint degree programs that combine law and forensic science.

Forensic science education is also thriving in the United Kingdom. According to data from 2012, approximately 75 universities offered courses in forensic science, including joint degree programs in law and forensic science. These courses aim to equip law students with a thorough understanding of forensic principles, methodologies, and their application within the legal field.

In Canada, various law schools offer around 32 courses in forensic science [24]. The inclusion of these courses reflects the growing recognition of the role of scientific evidence in the legal system, preparing future lawyers to navigate the complexities of contemporary legal cases. Australia presents a similar trend, with many law schools offering courses in forensic science and joint degree programs that combine law and forensic science [25]. For instance, the University of Technology Sydney provides a joint LLB and Bachelor of Forensic Science.

The utilization of forensic science carries on with increase in size above the world. In Ghana, vital development took off in 2011, inclusive of the institution of modern DNA describes and the setting up of an robotic fingerprint identification system. These evolution have conduct to some positive collision on the transportation of fairness, inclusive of the vindication of a incorrectly imprison individual. However, analysis of the policy-related feature of forensic science be visible opening in law-making, governance, service provision, quality word of honor and accreditation, education and investigation. An important counsel to upgrade forensic science in Ghana is the design of a “national policy strategy”, a blueprint literate by apposite stakeholders, best operation from other countries and the standing of the meadow. Intention to the plans matter recognize in this analysis will make certain a more strong application of forensic science in providing secure fairness and increase general security.

In India, forensic science courses have gained significant public interest recently.

Offerings include BSc and MSc degrees in Forensic Science, an MSc in Forensic Science and Criminology, a Master's in Forensic Psychology, an MSc in Information Security and Cyber Forensics, an MD in Forensic Science and Toxicology, a Diploma in Forensic and Criminal Law, PG Diplomas in Fingerprint Expertise and Humanitarian Forensics, as well as various certificates in forensic science and cyber forensics.

CHALLENGES OF INCORPORATING FORENSIC SCIENCE INTO LEGAL EDUCATION

Despite the benefits of incorporating forensic science into legal education in Pakistan, various challenges arise from this approach.

Lack of Expertise

Pakistan faces a shortage of qualified forensic experts and faculty members capable of teaching forensic science effectively to law students [26]. Finding experienced professionals with a robust background in both law and forensics poses significant challenges. Building a pool of competent instructors and practitioners who can deliver high-quality forensic education and training will take time and may require collaboration with forensic science institutes and professionals.

Limited Resources

Another significant challenge is the scarcity of resources, including laboratories, equipment, and materials necessary for teaching forensic science [27]. Establishing and maintaining well-equipped forensic laboratories can be costly, necessitating substantial investments from educational institutions and the government. Compared to other countries, Pakistan lags in forensic infrastructure, making it difficult to provide law students with hands-on training and experience in forensic techniques.

Curriculum Development

Creating a comprehensive curriculum that effectively integrates forensic science into Pakistan's existing legal education framework is complex. This process requires careful planning, coordination, and

collaboration between legal and forensic experts to develop a syllabus that covers essential forensic topics while aligning with overall legal education requirements and standards. Additionally, obtaining approval from regulatory bodies and authorities can be challenging.

Resistance to Change

Curriculum changes may face resistance from traditional stakeholders within the legal education system. Some faculty members and administrators may be hesitant to adopt new teaching methodologies or introduce additional subjects into an already crowded curriculum. Gaining support for the integration of forensic science will likely require effective advocacy and awareness campaigns.

Continuous Development

Forensic science is a rapidly evolving field, with new techniques and advancements emerging regularly [28-31]. To ensure the relevance and effectiveness of forensic education, continuous updates for teaching faculty are essential. Keeping educators informed of the latest developments and providing opportunities for professional development can be a challenge that requires institutional commitment and support.

Practical Training Opportunities

Providing practical training opportunities is crucial for the effective education of law students in forensic science. Forensic science necessitates hands-on practical training to foster proficiency. Providing students with opportunities for real-life case scenarios, mock crime scenes, and internships or externships in forensic laboratories presents a significant challenge. Collaborating with law enforcement agencies and forensic institutions to implement practical training programs for both teachers and students can help address this issue.

➤ Universities offering Forensic Science in Pakistan

The various universities are offering BS and MPhil in forensic science. The universities that started these programs are as follows:

Table 1: Institute offering graduate and postgraduate programs of forensic sciences.

	Institute	City	Degree, Duration
BS Program	The Islamia University of Bahawalpur	Bahawalpur	BS, 4 Years
	Government College Women University	Faisalabad	BS, 4 Years
	Khawaja Fareed University of Engineering & Information Technology	Rahim Yar Khan	BS, 4 Years
	University of Swat	Swat	BS, 4 Years
	The University of Modern Sciences	Tando Muhammad Khan	BS, 4 Years
	The Superior University	Lahore	BS, 4 Years
	Emerson University Multan	Multan	BS, 4 Years
	Government College University	Lahore	BS, 4 years
	University of Veterinary and Animal Science	Lahore	BS, 4 years
	University of Health Sciences	Lahore	BS, 4 years
MPhil/MS	University of Health Sciences	Lahore	M.Phil, 2 Years
	The University of Lahore	Lahore	M.Phil, 2 Years
	University of Central Punjab	Lahore	MS, 2 Years

CONCLUSION

In conclusion, this research paper posits that incorporating forensic science into legal education programs in Pakistan could significantly benefit both legal education and practice. Such an integration has the potential to improve the overall quality and efficiency of the justice system while also enhancing the knowledge and skills of legal professionals.

The existing literature on forensic science education underscores the necessity of embedding forensic science within legal curricula. Research indicates that forensic science education not only fosters critical thinking among law students but also sharpens their analytical abilities, broadens their skills in evidence evaluation, and

deepens their understanding of the scientific principles underlying forensic evidence. Nevertheless, there are challenges to consider when introducing forensic science into legal education. By addressing these obstacles, Pakistan's legal education system can be revitalized, ultimately strengthening the justice system.

Author(s) Contribution: data collection and review, G. Sara.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical Approval: Not applicable

Conflict of Interest: The author(s) declared no potential conflict of interest.

Consent for Publication: All authors approved the manuscript for publication.

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