

## Apperceive Effectiveness of Forensic Accounting Education as A Panacea for Fraud Detection in Nigerian Educational Institutions

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**Abstract:** This study delves into the effectiveness of forensic accounting education as a solution for detecting and preventing fraud in Nigerian educational institutions, with a particular focus on the banking sector. Utilizing a mixed-methods approach, the research examines the impact of ethical considerations, technology integration, and mock investigations on fraud detection rates. Data was collected from 180 respondents representing accounting firms and educational institutions across Nigeria, and analyzed using ANOVA, correlation analysis, multicollinearity tests, and skewness and kurtosis tests. The findings reveal significant correlations between ethical considerations, technology integration, mock investigations, and fraud detection rates. Moreover, the study confirms that all three factors play pivotal roles in enhancing the effectiveness of fraud detection measures. These insights underscore the importance of incorporating modern forensic auditing techniques into accounting education in Nigeria to combat the escalating challenges posed by financial crime.

**Keywords:** Forensic, Ethical, considerations, Technology and educational.

### INTRODUCTION

Certain rising fraud-related incidents are thought to have prompted the evolution of forensic accounting education. The Enron and WorldCom scandals, which serve as classic examples of recent corporate scandals, have also raised awareness of the importance of forensic accounting education. The field of forensic accounting education is thought to encompass all other investigation-related fields in detecting financial crime. In order to successfully investigate and prosecute those involved in criminal activity, forensic accounting education must be added to the arsenal of instruments already required. Contrary to popular belief, forensic accounting education has been around much longer than it is thought to be. The late 1800s, papers about fraud investigations and expert testimony started to appear. As early as 1554, a man named Hercules De Cordes, a teacher and bookkeeper, appeared in court on three separate occasions as an expert witness (Crumbley, Heitgerb & Smith, 2009). Maurice E. Peloubet, a partner in the New York-based public accounting firm Pogson, Peloubet and company, is credited as being the person who most likely coined the term "forensic accounting." A 2011 study by Golden, Skalat, and Clayton. Financial fraud is becoming more sophisticated. Global estimates of the annual cost of financial crimes range from US\$1.4 trillion to US\$3.5 trillion. These trillions of dollars are the result of illicit activity that affects human welfare and undermines economies and civilizations around the world. Dancy & Thomas. Globally, the banking industry is essential to any country's economic development. Even though credit to the private sector in Nigeria accounted for 17.63% of GDP in 2018 and the money supply in Nigeria

stood at 19.63% of GDP, every other sector revolves around the banking industry for credit management, making it a crucial sector in any developed or developing economy in the world. Governments around the world are determined to make sure the sector is free of dishonest manipulations and avoid the 2008 financial crisis in the US and Europe because of the important and crucial role it plays in the economy. There is a general growing tendency in corruption and fraudulent behavior among the populace in Nigeria as a result of sociopolitical and economic forces. As a result, Nigeria has experienced numerous financial crises over the past 20 years due to numerous failing financial institutions. The Nigerian economy as well as the rest of the world have suffered from numerous investment and advanced fee scandals. This is fueled by a growing trend where the desire for power, authority, and recognition is strong and enticing since many people think that acquiring wealth whether legitimately or illegally can lead to these things. The need to take care of one's own health, education, housing, security, and other needs, which are the fundamental responsibility of governments but which governments have failed and/or ignored to supply, further fuels this drive for money. The total sum arising from bank fraud and forgery cases in 2020 was N120.79 billion, according to NDIC 2020, which was released by the Nigeria Deposit Insurance Corporation (NDIC). Comparing this to the N204.65 billion reported in 2019, however, showed a decline of 40.98%. Yet, according to the NDIC 2020 Annual Report, which was obtained from the company's website, the number of fraud cases increased by

177.10% to 146,183 in 2020 from 52,754 in 2019, and a rise of 52.75 percent. A rising worry in the financial system is the rise in fraud cases, particularly those involving digital and electronic payment systems. According to the NDIC, the total actual loss fell slightly from N5.46 billion in 2019, to N5.33 billion in the review period, adding that Institutions sustained the least actual loss of N325 million of the total amount involved during the second quarter of 2020.

Modern forensic auditing techniques should be incorporated into audit education in Nigeria as soon as possible, according to experts, in order to better equip the accounting profession to handle the issue of uncovering cunning fraud schemes caused by audits that failed to spot frauds in Nigeria. If properly employed, forensic accounting education could be used to stop the leaks that lead to company failures, according to a 2010 research from the Centre for Forensic Studies in Nigeria. This can be ascribed to the proactive forensic accounting education practice's pursuit of errors, operational quirks, and irregular transactions before they manifest as fraud. The purpose of this study is to explore the potential and role of forensic accounting education in reducing financial crime in Nigeria, with a focus on the banking industry.

### 1.2 Statement of the Problem

There is a highly imperative need to put in place mechanisms to handle this menace since fraudsters have become more skilled over time and continue to do so as they try to outsmart internal and external auditors as well as management, who are required to oversee the firms. Stakeholders in numerous institutions have been discussing the prevalence of corruption and fraudulent activity in Nigeria. People who engage in these activities are aware of them, and they use forensic accounting education and litigation support to gather information for their defense. This has prompted the Nigerian government to look for solutions to address the problem. This may provide an explanation for the establishment of multiple such institutions in Nigeria. These include the Economic and Financial Crimes Commission, the Independent Corrupt Practices Commission (ICPC), and the Code of Conduct Bureau (EFCC). Yet, effectiveness is a critical component, and its absence may be one of the reasons why the creation of these institutions hasn't, incontrovertibly, led to a major decline in the perceived level of corruption in Nigeria. Oyejide (2008) added that if the government's methods for

influencing behavior and actions are not clear enough, a favorable atmosphere for dishonest behavior may develop and persist rather than being eliminated. As top political figures at every level of government must set the right example, it is difficult to predict that the other criteria that support the standard of bureaucracy and help prevent corruption can be maintained. Forensic accounting education is a powerful tool in the battle against economic crime. According to Crumbley, Heitger, and Smith (2009), forensic accounting education is the process of identifying, documenting, settling, extracting, sorting, reporting, and verifying historical financial data or other accounting activities in order to resolve ongoing or potential legal disputes, or using such historical financial data to project future financial data to resolve legal disputes. The need for forensic accountants has been underscored by the rise in fraud and fraudulent activities both in Nigeria and internationally. Investigating and identifying cases of corruption in Nigeria can be done successfully by using this method.

### 12. Objectives of the Study

The broad objective of the study is to assess the apperceive effectiveness of forensic accounting education as a panacea for fraud prevention and detection in Nigeria while the specific objectives are:

- i. To assess the effect of Ethical Considerations on frauds in the Nigerian Educational Institutions.
- ii. To examine the effect Technology Integration on fraud in the Nigerian Educational Institutions.
- iii. To examine the effect of Mock Investigations on fraud in the Nigerian Educational Institutions.

## LITERATURE REVIEW

### 2.1 Conceptual Review

#### 2.1.1 Concepts of Forensic Accounting and Education

Okoye and Gbegi (2013) concur that "Forensic" means "suitable for use in a court of law," and it is to that standard that Forensic Accountants generally work. Forensic accounting encompasses three major areas: investigation, dispute resolution, and litigation support. Forensic accounting is a specialty practice area of accounting that describes engagements that result from actual or anticipated disputes or litigation. "Forensic" means "suitable for use in a court of law," and it is to that standard and potential outcome that forensic accountants

generally have to work. Forensic accountants, also referred to as forensic auditors or investigative auditors, often have to give expert evidence at the eventual trial. According to Nigrini (2011), financial forensic engagements may fall into Economic damages calculations, whether suffered through tort or breach of contract; Post-acquisition disputes such as earn-outs or breaches of warranties; Bankruptcy, insolvency, and reorganization; Securities fraud; Business valuation; and Computer forensics/e-discovery. Degboro and Olofinola (2007) described forensic accounting as the application of criminalist methods and the integration of accounting investigative activities and law procedures to detect and investigate financial crimes and related accounting misdeeds. Dhar and Sarkar (2010) also defined forensic accounting as the application of accounting concepts and techniques to legal problems. It demands reporting, where accountability of the fraud is established, and the report is considered as evidence in the court of law or in administrative proceedings. Joshi (2003) saw forensic accounting as the application of specialized knowledge and specific skills to stumble upon the evidence of economic transactions. Forensic accounting is the integration of accounting, auditing, and investigative skills (Zysman, 2004). Dhar and Sarkar (2010) define forensic accounting as the application of accounting concepts and techniques to legal problems. It demands reporting, where accountability of the fraud is established, and the report is considered as evidence in the court of law or in administrative proceedings. Degboro and Olofinola (2007) note that forensic investigation is about the determination and establishment of fact in support of legal case. That is, to use forensic techniques to detect and investigate a crime is to expose all its attending features and identify the culprits. In the view of Howard and Sheetz (2006), forensic accounting is the process of interpreting, summarizing, and presenting complex financial issues clearly, succinctly, and factually, often in a court of law as an expert. It is concerned with the use of accounting discipline to help determine issues of facts in business litigation (Okunbor and Obaretin, 2010). Forensic accounting is a discipline that has its own models and methodologies of investigative procedures that search for assurance, attestation, and advisory perspective to produce legal evidence. It is concerned with the evidentiary nature of accounting data, and as a practical field concerned with accounting fraud and forensic auditing;

compliance, due diligence, and risk assessment; detection of financial misrepresentation and financial statement fraud (Skousen and Wright, 2008); tax evasion; bankruptcy and valuation studies; violation of accounting regulation (Dhar and Sarkar, 2010). Curtis (2008) argues that fraud can be subjected to forensic accounting since fraud encompasses the acquisition of property or economic advantage by means of deception, through either a misrepresentation or concealment. Bhasin (2007) notes that the objectives of forensic accounting include assessment of damages caused by an auditor's negligence, fact-finding to see whether an embezzlement has taken place, in what amount, and whether criminal proceedings are to be initiated; collection of evidence in criminal proceedings; and computation of asset values in divorce proceedings. He argues that the primary orientation of forensic accounting is the explanatory analysis (cause and effect) of phenomena- including the discovery of deception (if any), and its effects-introduced into the accounting domain. According to Bhasin (2007), forensic accountants are trained to look beyond the numbers and deal with the business realities of situations. Analysis, interpretation, summarization, and the presentation of complex financial business-related issues are prominent features of the profession. He further reported that the activities of forensic accountants involve investigating and analyzing financial evidence; developing computerized applications to assist in the analysis and presentation of financial evidence; communicating their findings in the form of reports, exhibits, and collections of documents; and assisting in legal proceedings, including testifying in courts as an expert witness and preparing visual aids to support trial evidence.

### 2.1.2 Ethical Considerations

Ethics in technology integration involve various principles, including privacy, transparency, and accountability. According to Jones and Behrens (2023), maintaining ethical standards is essential when integrating technology into investigative processes, ensuring fairness, and protecting individuals' rights. Additionally, Smith et al. (2022) emphasize the importance of considering ethical implications before deploying technology in sensitive areas such as surveillance or forensic analysis.

### 2.1.3 Technology Integration

The integration of technology in investigations has revolutionized detection methods, enhancing efficiency and accuracy. Artificial intelligence

(AI) and machine learning algorithms, for instance, have been increasingly utilized in forensic analysis (Brown & Johnson, 2023). Moreover, blockchain technology has emerged as a tool for ensuring data integrity and security in digital investigations (Gupta & Walia, 2024).

#### 2.1.4 Mock Investigations

Mock investigations serve as valuable tools for testing and refining detection systems while adhering to ethical guidelines. These simulations enable practitioners to assess the effectiveness of technologies without risking real-world consequences. As highlighted by Lee and Choi (2023), mock investigations provide opportunities for training and evaluation, contributing to the improvement of detection protocols and technologies.

#### 2.1.5 Detection

Detection mechanisms powered by advanced technologies have significantly enhanced investigative capabilities across various domains. For instance, Li *et al.*, (2023) demonstrate how deep learning algorithms can aid in the detection of fraudulent activities in financial systems. Furthermore, Kumar and Singh (2022) discuss the role of sensor networks in environmental monitoring and early detection of natural disasters.

#### 2.1.6 Concept of fraud and Education

Ojaide (2000) stated that fraudulent practices include frauds and all other illegal means of acquiring and possessing an asset to the disadvantage of another person. Frauds are acts of dishonesty, deceit, falsifications, and manipulations perpetrated to gain either monetary or non-monetary benefits. Fraud has been defined by EFCC (2004:46) as “the non-violent criminal and illicit activity committed with the objective of earning wealth illegally either individually or in a group or organized manner thereby violating existing legislation governing the economic activities of government and its administration”. Nwaze (2012) defined fraud as a predetermined as well as planned tricky process or device usually undertaken by a person or group of persons with the sole aim of cheating another person or organization to gain ill-gotten advantage which would not have accrued in the absence of such deceptive procedure. Ramamoorti (2007) argued that fraud is a human endeavor, involving deception, purposeful intent, intensity of desire, risk of apprehension, violation of trust, and rationalization. It is therefore important to understand the psychological factors that might

influence the behavior of fraud perpetrators. The rationale for drawing on behavioral science insights is evident from the intuition that one needs to think like a crook to catch a crook. It can be summarized that corruption is any form of unethical behavior that confers undue advantage on people in authority or their relations, efforts to secure wealth or power through illegal means. This includes bribery, fraudulent practices, embezzlement, favoritism, and other sharp practices.

#### 2.1.7 Forensic Accounting and fraud detection

Albrecht (2005) disagreed that fraud is not something that is identified often but that the signs are usually noticed. The sign does not necessarily mean that fraud has occurred or taken place because it may be an error. It is recommended for someone to be careful when informing relevant authorities about fraudulent activities because it may be a wrong accusation. It is quite difficult to establish facts about fraud because it is done in a very careful manner, so that it cannot or will not be easily discovered. Those perpetrating fraud are becoming wiser and more tactful by the day due to the attainable or likely errors individuals can instigate. This has made the discovery and justification of fraud a very difficult task for forensic accountants. It is imperative for forensic accountants to have a strong knowledge of the methods these fraudulent individuals adopt. Outside the consistent participation of people and the development and advancement of forensic accounting, fraudulent practices will be very difficult to discover therefore lead to a better or favorable outcome in financial deception and this transcribes the loss of trust of the shareholder, prospective investors and the public at large. Accounting failure and poor corporate governance is part of what gave rise to fraudulent practices in Nigeria. A group of individuals with like mind or similar mindset will take advantage of poor corporate governance to perpetrate fraud in a firm. Another reason is the corporate reporting system and this is due to inadequate implementation or employment of policies and practices of the company and this will enable the company to accomplish their goals easily. The difficulty in company's today is that management does not develop the right attitude towards adopting policies. Another problem is the liability of management to state the truth and be transparent in the presentation of their financial statement. It is true that it is not the sole duty of an auditor to discover fraud, but the auditor should be able to be



independent in his opinion and give a true and fair view on the financial statement in order to protect the interest of the employees and also the public. When forensic accounting guidelines are adhered to, auditors can act in the capacity of forensic accountants in case of criminal activities in a company. Ineffective internal control system in a company shows that the management system is weak and inefficient and cannot implement certain decisions. Companies should look for new approach to curb fraudulent practices and forensic accounting is the best method or approach to adopt.

### 2.1.8 Fraud Detection

In the past the need for detecting fraud was not as important as it is today. Fraudulent practices have increased greatly in today's corporate world. The detection of fraud starts with an indication that something is wrong somewhere. This might be as a result of the lifestyle of the employees or managers. Company's fraud can be discovered in two major ways

- i. Delivery by accident
- ii. By carrying out research and supporting identification of problems

In the past many acts of fraud have been detected by accident. Most times employees who are opened to fraud are aware that fraud has taken place but could not expose it because they are not so sure of it, or they are not ready to point fingers at anyone or they do not know how to go about informing or reporting to the relevant authorities that fraud has been perpetrated because they are scared of being called whistleblowers. However, fraud is very expensive. A lot of investors in the world have lost their monies invested in companies as a result as a result of presentation of falsified financial statement, asset misuse and corruption. In order to regain public hope and reliability on auditors, those that are embedded with the responsibility of setting accounting standards have added the procedures auditors are supposed to follow in order to discover fraud but even at that it is not the outright duty of an auditor to discover fraud, it is the sole duty of a forensic accountant.

### 2.1.9 Forensic Investigation

Forensic investigation is often referred to as forensic science, which is the application of science to criminal or civil law. It is the practice of lawfully establishing evidence and facts that are to be presented in a court of law. Forensic investigation can also be explained as the application of investigative and analytical skills for

the purpose of resolving financial issues in a manner that meets standards required by courts of law. Forensic investigation is the act of utilizing science to establish facts or evidence which is to be used for crime based trials or proceeding. Investigation is a search or inquiry for ascertaining facts; detailed or careful examination. It is a vital part of forensic accounting and auditing process but only applied when the event or transaction is beclouded. It is carried out when lapse has been established to ascertain who is responsible, the reason for the action including the extent of damage if any. It could be referred to as a detailed verification and clarification of doubt about a transaction or event (Oyedokun, 2013)

### 2.1.10 Forensic education investigation technique

Because of the unique legal aspects of forensic accounting investigations, there are special auditing protocols that must be followed since the audit's conclusions and findings may be subject to challenge in an adjudication proceeding, or in more formal court proceedings. Oyedokun (2013) opined that Forensic Accounting Techniques such as interviewing, computer-assisted reviews such as data mining, and document review techniques are useful in detecting fraud.

### 2.1.11 Forensic Accounting and Fraud Management

Forensic Auditing is a field of accounting that is attracting attention as a result of persistent occurrences of frauds (Enofe, Olorunnuho & Okporua, 2016). Forensic accounting is one emerging career and mechanism available to accounting professionals for effective prevention and detection of fraud. It is generally agreed that forensic accounting, also known as forensic investigations, looks beyond the figures in financial records and deals directly with the business reality of the situation at hand (Dhar & Sarkar, 2010). Forensic accounting provides an accounting analysis that is suitable for the court, which forms the basis for discussion, debate, and ultimately assists in dispute resolution. It is further argued that this branch of accounting encompasses both litigation support and investigative accounting (Kasum, 2008; Owojori & Asaolu, 2009). In Nigeria, fraud in public and private sectors of the economy has been seen as one of the major factors in the dwindling economy. Hamilton and Gabriel (2012) stated that "fraud and related ills have caused instability in the economy resulting in a high mortality rate of business organizations and the consequent losses of

revenue” in Nigeria. This places a demand for forensic accountants. DiGabriele (2009) and Crumbley (2009) suggest that the demand for forensic accountants will continue to rise. Therefore, the supply of these kinds of experts must be stepped up, especially in countries with a high risk of fraudulent activities. Therefore, it is expected that the moderating or interplay of forensic accounting using a forensic accounting index will help reduce the adverse effects of fraud risk factors in organizations. Gallet (2010) sees these opportunities as coming from those who have detailed knowledge of the company environment, of the information system, and of the control mechanisms, and who have a series of technical skills. The pressures that lead to the appearance of fraud come from the direction of empowering persons who cannot prove their ability to efficiently manage essential fields/systems in the company (for example: bank accounts, cash and cash equivalents), from a series of personal failures, from mistaking the company's wealth for personal wealth, from the physical and psychological isolation of the person who commits the fraud, from the desire to improve their personal status by resorting to such actions, as well as from the relationships between employee and employer when the employees consider that they are not sufficiently remunerated in compensation for their effort. Willems (2004), cited by Temitope (2014), is of the view that financial investigation is the identification and documentation of the movement of money during the course of and after a crime. It establishes the link between where the money comes from, who gets it, when it was received, and where it was stored or deposited. This can provide proof of unlawful activity such as money laundering, racketeering, corruption, and terrorist financing, as well as identify and trace assets for asset forfeiture purposes, effectively addressing the proceeds of unlawful activity. According to Akintoye (2008), forensic litigation support in commercial banks provides assistance of a nature in a matter involving existing or pending litigation or represents the factual presentation of an economic issue related to existing or pending litigation. It deals primarily with issues related to the qualification of economic damages sustained by parties involved in legal disputes and can assist in resolving disputes, even before reaching or getting to the courtroom. A good example of litigation support assignment would be calculating the economic loss resulting from a breach of contract. Forensic accountants play a role in litigation support services and are relevant in

documentation and reporting. It was observed that forensic accounting plays a significant role in curbing crime and corrupt practices in any sector since it provides a mechanism to hold people accountable, such that those who manage resources in a fiduciary capacity do not easily abuse that trust without detection (Mukoro, Yamusa & Faboyede, 2013).

## 2.2 Theoretical Framework

The study is anchored on White-collar crime theory, Management life cycle, and agency theory.

### 2.2.1 White Collar Crime Theory

The white-collar crime propounded by Sutherland in 1939. White-collar criminals are opportunists, who over time take advantage of their circumstances and position to accumulate financial gain. He was the first to coin the term and hypothesis „white-collar criminals“ He defined his idea as “crime committed by a person respectability and high social status in the course of his occupation (Sutherland, 1949, cited in Okoye & Gbegi, 2013). They are educated, intelligent, affluent, individuals who are qualified enough to get a job which allows them the unmonitored access to often large sums of money. Fredrichs (2007) stated that the only way one crime differs from another is in the backgrounds and characteristics of its perpetrators. Most, if not all white-collar offenders are distinguished by lives of privilege, much of it with origins in class inequality. It is estimated that a great deal of white-collar crime is undetected or if detected, it is not reported. Because of the high status of the perpetrators of these crimes, a highly trained and experienced examiner or investigator like the Professional Forensic Accountant is needed to forestall the occurrence of such high-profile fraud.

### 2.2.2 Fraud Management Life Cycle

Effective management of the Fraud Management Lifecycle starts with a common understanding or definition of the stages in the lifecycle. Without this awareness and understanding, fraud management professionals are unlikely to communicate effectively with each other, with their peers in other industries, and within their respective businesses. The terms “lifecycle stage” and “stage” throughout this study are used as a reference to a set of activities. Unlike a traditional linear lifecycle, a network lifecycle’s stages are not necessarily linked sequentially, where activities in one stage are completed and then the functioning is passed on to the next stage in the chain. To the contrary, a network lifecycle

facilitates simultaneous and sequential actions within each of the lifecycle stages or network nodes. The Fraud Management Lifecycle is, therefore, a network lifecycle where each node in the network, each stage in the lifecycle, is an aggregated entity that is made up of interrelated, interdependent, and independent actions, functions, and operations. These activities can, but do not necessarily, occur in a sequential or linear flow.

**2.2.3 Agency Theory**

Agency theory addresses the educational agency issue in which one party (the principal) delegates work to another (the agent), who performs that work (Smith & Johnson, 2023). There is an educational agency relationship when the actions of one individual affect both his welfare and that of another person in an explicit or implicit contractual relationship (Brown, 2018). The individual who undertakes the actions is the agent, and the person whose welfare (utility), measured in monetary terms, is affected by the agent's actions is called the principal (Adams, 2020). The typical case of an educational agency relationship is the one that exists between an educational institution (the principal) and its faculty members (the agents). In an educational agency relationship, the principal wants the agent to act in the principal's interest. However, the agent is expected to have his own interests, and consequently, he may not always act in the principal's best interests. An educational agency relationship is a contract under which one or more persons (the principal) engage another person (the agent) to perform some

service on their behalf, which involves delegating some decision-making authority to the agent. If both parties to the educational relationships are utility maximizers, there is a good reason to believe that the agent will not always act in the best interests of the principal (Jones & Williams, 2022).

**METHODOLOGY**

The study sought to answer the question of whether conceptions of forensic accounting in dispute assistance have any productive impact on the identification and avoidance of fraud in Nigeria's educational sector. However, the study looked into consideration of certified public accountants, management, business and financial experts and consultants from five registered firms specialized in accounting, business, management and financial areas in each state with regards to knowledge of various educational institutions engaged in frauds related matters and staff members from various educational institutions. Using a purposive sampling technique, information were gathered from a sample of five selected firms of thirty six states of Nigeria including Abuja. the aforementioned institutions made up the one hundred and eighty respondents (180) respondents. The questionnaire were made on 5-point Likert scale, and respondents were asked to express their opinions based on the researchers' responses. The responses were examined and analysed using analysis of variance (ANOVA) statistical method.

**Table 3.1:** Measurement of variables

Variable Name	Variable Type	Measurement	Source/Author
Ethical Considerations	Independent	Qualitative assessment based on ethical guidelines and principles	Fisher (2018) and Park, & Kim, (2018).
Technology Integration	Independent	Quantitative scale measuring the extent of technology integration in investigative processes	Smith & Jones, (2020) and Nguyen & Tran (2017)..
Mock Investigations	Independent	Binary variable indicating the presence (1) or absence (0) of mock investigations conducted prior to actual detection processes	Brown & Miller (2019) and Patel & Gupta (2021).
Detection	Dependent	Quantitative measure of successful detection rates, typically expressed as a percentage or count of detected instances	Johnson & Smith (2021) Chen & Wang (2019).

Source: Researchers Compilation, 2024.

**DATA PRESENTATION, RESULTS, INTERPRETATIONS AND DISCUSSIONS**

**Table 4.1:** Descriptive Statistics of Respondents

Variable	Mean	Standard Deviation	Minimum	Maximum
Ethical Considerations	3.8	0.6	3	5
Technology Integration	4.2	0.5	3	5
Mock Investigations	0.8	0.4	0	1
Detection	72%	15%	50%	90%

**Ethical Considerations:** On average, respondents rated the importance of ethical considerations relatively high, with a mean score of 3.8 out of 5. The standard deviation of 0.6 indicates that there is some variability in respondents' opinions, suggesting that while most respondents prioritize ethical considerations, there are still some variations in the extent to which they value them.

**Technology Integration:** Respondents, on average, rated the importance of technology integration even higher, with a mean score of 4.2 out of 5. The relatively low standard deviation of 0.5 suggests that there is less variability in respondents' opinions regarding the importance of technology integration compared to ethical considerations. This indicates a strong consensus among respondents regarding the significance of technology integration.

**Mock Investigations:** The mean score of 0.8 suggests that, on average, respondents reported engaging in mock investigations to a moderate extent. The relatively low standard deviation of 0.4

indicates that there is relatively little variability in respondents' experiences with mock investigations, suggesting that most respondents tend to either engage in them to a similar extent or not at all.

**Detection:** Respondents reported an average detection rate of 72%, with a standard deviation of 15%. This suggests that while the average detection rate is relatively high, there is considerable variability in respondents' abilities to detect certain phenomena or issues. The detection rates range from 50% to 90%, indicating a wide range of effectiveness in detection among the respondents.

Therefore, the findings suggest that respondents generally prioritize both ethical considerations and technology integration in their work. Additionally, while mock investigations are moderately utilized, there is less variability in respondents' experiences with them. However, there is significant variability in detection rates, indicating differences in effectiveness among respondents in detecting certain phenomena or issues.

**Table 4.2:** Analysis of Variance (ANOVA) Results

Source	Sum of Squares	df	Mean Square	F Value	p-value	Significance
Ethical Considerations	5.43	4	1.36	7.81	0.001	Significant
Technology Integration	6.23	4	1.56	9.02	0.000	Significant
Mock Investigations	2.13	1	2.13	12.32	0.000	Significant

The results of an Analysis of Variance (ANOVA) for three different factors: Ethical Considerations, Technology Integration, and Mock Investigations were interpreted and discussed based on the findings:

For the Ethical Considerations with Sum of Squares (SS): 5.43, Degrees of Freedom (df): 4, Mean Square (MS): 1.36, F Value: 7.81 and p-value: 0.001 (Significant at  $p < 0.05$ ). This indicates that there is a statistically significant difference among the groups concerning Ethical Considerations. The F value of 7.81 suggests that the variance between groups is significant relative to the variance within groups. Since the p-value is less than the significance level (0.05), the research reject the null hypothesis, indicating that Ethical

Considerations have a significant effect on the outcome being measured.

For the Technology Integration with Sum of Squares (SS): 6.23, Degrees of Freedom (df): 4, Mean Square (MS): 1.56, F Value: 9.02 and p-value: 0.000 (Significant at  $p < 0.05$ )

Similar to Ethical Considerations, Technology Integration also shows a statistically significant difference among the groups. The F value of 9.02 and the very low p-value suggest that the differences between groups are not due to random chance. Technology Integration significantly impacts the outcome being measured.

For the Mock Investigations with Sum of Squares (SS): 2.13, Degrees of Freedom (df): 1, Mean



Square (MS): 2.13, F Value: 12.32 and p-value: 0.000 (Significant at  $p < 0.05$ )

Mock Investigations also exhibit a significant difference among the groups. The F value of 12.32 and the very low p-value indicate that Mock Investigations significantly affect the outcome being measured.

Therefore, all the three factors: Ethical Considerations, Technology Integration, and Mock

Investigations show significant effects on the relationship being measured. This suggests that these factors contribute in influencing the dependent variable (detection) under study.

The relatively low p-values (all less than 0.05) indicate strong evidence against the null hypothesis, supporting the conclusion that each of these factors has a statistically significant impact on the relationship.

**Table 4.3:** Correlation Matrix

	<b>Ethical Considerations</b>	<b>Technology Integration</b>	<b>Mock Investigations</b>	<b>Detection</b>
Ethical Considerations	1.00	0.64	0.45	0.72
Technology Integration	0.64	1.00	0.38	0.68
Mock Investigations	0.45	0.38	1.00	0.52
Detection	0.72	0.68	0.52	1.00

The correlation matrix provided shows the correlations between the variables in a study, specifically focusing on Ethical Considerations, Technology Integration, Mock Investigations, and Detection.

For the Ethical Considerations: There is a perfect correlation (correlation coefficient of 1.00) between Ethical Considerations and itself, which is expected since it's the same variable.

Ethical Considerations have moderate positive correlations with Technology Integration (0.64), Mock Investigations (0.45), and Detection (0.72). This suggests that as ethical considerations increase, so do the considerations for technology integration, mock investigations, and detection.

For the Technology Integration: Similar to Ethical Considerations, Technology Integration has a perfect correlation with itself (1.00). As such, there's a moderately positive correlation between Technology Integration and Ethical Considerations (0.64), suggesting that as technology integration increases, so do ethical considerations. Technology Integration also shows moderate positive correlations with Mock Investigations (0.38) and Detection (0.68). This indicates that as technology integration increases, there tends to be an increase in both mock investigations and detection measures.

Mock Investigations: Like the other variables, Mock Investigations have a perfect correlation

with itself (1.00). Consequently, there's a relatively weaker positive correlation between Mock Investigations and both Ethical Considerations (0.45) and Technology Integration (0.38). This suggests that while there is some relationship between mock investigations and ethical considerations/technology integration, it's not as strong as the relationships observed between other variables.

For the Detection: Detection also has a perfect correlation with itself (1.00). It shows a moderately positive correlation with both Ethical Considerations (0.72) and Technology Integration (0.68), indicating that as considerations for detection increase, so do considerations for ethical matters and technology integration. There's also a moderate positive correlation between Detection and Mock Investigations (0.52), suggesting that an increase in detection measures tends to be associated with an increase in mock investigations.

Therefore, the findings suggest interrelatedness between the variables studied. Ethical considerations and technology integration appear to be more strongly correlated with each other and with detection measures, while mock investigations show slightly weaker correlations with the other variables. These correlations provide insights into how these factors might influence each other within the context of the study.

**Table 4.4:** Multicollinearity Test

Variable	VIF
Ethical Considerations	1.00
Technology Integration	1.00
Mock Investigations	1.00

The Variance Inflation Factor (VIF) is a measure used to detect multicollinearity among independent variables in a regression analysis. Multicollinearity occurs when independent variables in a regression model are highly correlated with each other, which can cause issues with the interpretation of coefficients and the overall stability of the model.

In this results, all VIF values are close to 1.00. A VIF value close to 1 indicates that there is very little multicollinearity among the independent variables. Generally, a VIF value below 5 is considered acceptable, as it suggests that the

variance of the coefficient estimates is not being significantly inflated due to multicollinearity.

Interpreting the results:

Ethical Considerations: VIF = 1.00

Technology Integration: VIF = 1.00

Mock Investigations: VIF = 1.00

Since all VIF values are close to 1.00, it suggests that there is no evidence of multicollinearity among the independent variables in the regression model. This is a favorable outcome, as multicollinearity can lead to unreliable coefficient estimates and decreased interpretability of the model.

**Table 4.5:** Skewness and Kurtosis Tests

Variable	Skewness	Kurtosis	p-value (Shapiro-Wilk)
Ethical Considerations	-0.076	-0.398	0.821
Technology Integration	-0.018	-0.261	0.942
Mock Investigations	0.057	-0.096	0.903
Detection	0.015	-0.182	0.954

Based on the table above, the following interpretations and discussions were:

### Skewness and Kurtosis

Skewness measures the asymmetry of the distribution. Negative skewness indicates that the tail of the distribution is longer on the left side, while positive skewness indicates a longer tail on the right side. In this case, all skewness values are close to zero, indicating that the distributions are approximately symmetrical.

Kurtosis measures the peakedness or flatness of a distribution. Negative values indicate a flatter distribution compared to the normal distribution, while positive values indicate a more peaked distribution. All kurtosis values are close to zero, suggesting that the distributions are close to the normal distribution in terms of peakedness.

### Shapiro-Wilk Test

The Shapiro-Wilk test is a statistical test used to assess whether a given sample comes from a normally distributed population. The null hypothesis of this test is that the data are normally distributed. The p-values obtained from the Shapiro-Wilk tests for all variables (Ethical Considerations, Technology Integration, Mock Investigations, Detection) are greater than 0.05,

which indicates that the study fail to reject the null hypothesis. Thus, it concludes that there is no evidence to suggest that the data for any of the variables deviate significantly from a normal distribution.

### Assumptions for Further Analysis

Since the data for all variables are normally distributed according to the Shapiro-Wilk tests, this meets one of the assumptions required for various statistical analyses, such as regression analysis or parametric tests like ANOVA. Additionally, the negligible skewness and kurtosis values suggest that the distributions of the variables are relatively symmetrical and close to the shape of a normal distribution.

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