

# The Evolving Landscape of Criminal Investigation: Exploring the Impact and Efficiency of Modern Technology in Forensic Analysis and Digital Investigations

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## ABSTRACT

As modern technology persists in pushing beyond the boundaries of what is possible, forensic specialists encounter several obstacles that affect their work. This study explores the experiences and challenges of forensic specialists in forensic analysis and digital investigation, examining the advantages and disadvantages of modern technology and their coping strategies. This study focuses on police officers in Davao City, both male and female, who have served seven years in active service within the agency. The study employs a qualitative phenomenological approach, examining people's daily experiences without relying on researchers' preconceived notions about the phenomenon. This study utilized a purposive sampling technique. Thematic analysis was employed as the chosen qualitative data analysis approach. The study revealed a significant increase in accuracy in forensic analysis, enhancing evidence and case resolutions because of this modern technology. However, it raises concerns about the high cost of crime laboratory equipment and the importance of continuous training among forensic experts. This study examines the impact of modern technology on respondents' daily lives, addressing struggles and challenges and establishing awareness for authorities and agencies to develop effective strategies.

**Keywords:** forensic experts, technological advancement, analysis, training, adaptation.

## INTRODUCTION

Every age has brought revolutionary innovations that have not only solved pressing problems but also unlocked new avenues of opportunity, from the invention of the wheel to the complexities of the Internet. Technology has advanced at an accelerating rate over the years. This growth in technology has driven institutions to incorporate technology as a vital component of their overall strategy. The expansion of information technology tools aimed at improving decision-making efficiency and speed has also impacted the role of intuition in an organization (Ramrathan & Sibanda, 2017).

In criminal and forensic investigation, technology has become a vital tool for law enforcement agencies worldwide as it aids in criminal investigation and gathering evidence against the perpetrator. The criminal justice environment has changed due to the introduction of advanced forensic procedures, digital gadgets, and surveillance systems (Tindwani, 2023). It transformed the criminal justice system,

modernized digital forensics, and helped identify offenders and the underlying causes of crimes (Garad, 2020).

The improvements in forensic science, data analytics, and technology have changed how crimes are prosecuted and resolved and how justice is served. Tsai (2023) stated that in the dynamic field of law enforcement, technology has a crucial influence on the procedures and results of crime-related inquiries. Technology has revolutionized crime investigations and evidence collection globally. In contrast, it raised ethical, legal, and rights-related concerns (Tindwani, 2023). In the study of Subash (2023), he stated that the adoption of new technology presents challenges such as the potential for error or misuse, which attest that, as technological advancement persists in pushing beyond the boundaries of what is possible, forensic specialists encounter several obstacles that affect the precision and the dependability of the result. Moreover, inadequate equipment makes forensic investigation less accurate and efficient, making it more difficult for forensic specialists or experts to do in-depth studies, hindering the pursuit of justice. Insufficient forensic skills and equipment harm law enforcement and other security personnel's ability to conduct forensic investigations (Ngboawaji, 2012).

In addition, modern technology has a considerable potential for misuse in forensic and criminal investigations. In the study of Tsai (2023), he stated that law enforcement monitoring is enhanced by surveillance technology like CCTV and facial recognition. However, ethical worries about privacy and abuse have spurred discussions concerning their broad usage. This creates arguments and discourse among criminal law jurists regarding the legality of their use, particularly in light of the potential violations of human rights and dignity that come with it (Adam, 2015; Abadee & Issa, 2023). In the field of digital investigation, where modern technology is widely used, one of the concerns is the corruption or alteration of data. In the digital forensics inquiry, the evidence may be manipulated or erased. Since digital data is easily changed or erased, thieves may try to hide their tracks by encrypting or wiping their data on their devices.

The ability of the police and other security agencies to conduct forensic investigations is severely impacted by inadequate or nonexistent forensic equipment and expertise (Ngboawaji, 2012). More so, Sai (2022) stated that the emergence of technology improves the accuracy and reliability of evidence, enabling quicker and more efficient analysis by forensic practitioners. This means that adequate equipment for forensic analysis and digital investigation has a huge impact on the pursuit of justice. In addition, it will enhance the speed and efficacy of the investigation and expand the analytical capabilities and advancements in digital investigation and the forensic analysis process. Furthermore, new technologies are transforming evidence analysis by improving specificity, reliability, greater applicability, and Efficiency, consequently considerably advancing the profession (Stoney & Stoney, 2015).

Modern technology enables forensic investigation in real-time and on-site studies, increasing the speed and efficacy of the criminal justice system (Kloosterman et al., 2015). Strengthening digital forensics improves crime detection and investigation, boosting the justice system (Goyal & Kaur, 2023). In addition, Northern Michigan University (2023) stated that, when assembling a criminal case, the methods used by forensic specialists and criminal investigators for gathering, analyzing, and interpreting evidence have been completely transformed by sophisticated digital tools and methods. Indeed, forensic specialists need to employ technology in criminal investigations to stay up to date with the present situation because technology is advancing quickly.

However, there are possibilities that technologies are really easy to misuse. The study by Hassan et al.

(2018) stated that to gather evidence in the modern era, tools, and technology are used for wiretapping, electronic surveillance, and computer data access, and he added that these techniques run the risk of jeopardizing the privacy of those who are being investigated or prosecuted for crimes. In addition, modern technology impacts us positively and negatively, and it is up to us whether we embrace it or be cognizant of its dark side. The Criminal Justice System in India is outdated, contributing to increased crime rates, especially in Kolkata, the capital.

To address this, there is a push for both the physical presence of judge courts and the integration of technology to improve court decisions and crime prevention. Forensic tools, such as digital and network forensics, retinal scanning, and trace evidence chemistry, combat crimes and enhance investigations in India (Garad, 2020). Conversely, forensic science is underutilized in the Philippines due to a lack of resources and qualified professionals, with up to 90% of cases relying solely on testimonial evidence (Go & De Ungria, 2019). However, in the City of Davao, the proliferation of technology has led to digital forensics as a crucial field for law enforcement, given the prevalence of virtual interactions on mobile phones and computers (Davao Portal, 2013).

Modern technology changed how forensic analysis and digital investigation should be done. New methods of investigation are introduced as one of the impacts of modern technology. In the theory of "Technology Determinism," culture and society are shaped by technology, not the other way around. It is predicated on the historical finding that new technologies are introduced with little consideration for their potential effects. Such technology has the potential to profoundly alter cultures and communities (Spacey, 2016).

In addition, the "Technological Instrumentalism" theory sees technology as a neutral tool for achieving specific aims or solving practical issues, emphasizing its role in domains such as transportation, communication, healthcare, and industry. It sees technology as a tool that helps people complete work more efficiently, overcome obstacles, and improve their quality of life. It mainly focuses on Efficiency, practicality, and effectiveness in achieving specific goals (Jain, 2023), which means that technology shaped and changed society, culture, and even the old practices we were used to. The methods used by forensic specialists and criminal investigators to collect, analyze, and interpret evidence have undergone a substantial paradigm shift due to the incorporation of advanced digital tools and processes. More so, this advancement will either impact or result positively or negatively. Because of this sudden change, forensic specialists and digital investigators face difficulties adjusting to the new methods being introduced.

This study aims to better understand the experiences, challenges, and different struggles of forensic specialists; specifically, it aims to explore their lived experiences in forensic analysis and digital investigation. Moreover, the researchers seek to document the advantages and disadvantages of modern technology and equipment in their daily work, how they cope with the disadvantages, and what insights we can learn from their experiences.

This study is significant, particularly in documenting the impact of modern technology on the daily lives and works of the respondents. It addresses the different struggles, challenges, and experiences the respondents have encountered in this modern era. This will establish awareness and help the authorities, administration, and agencies develop appropriate strategies and measures to address this problem. Completing this study will serve as the foundation for further studies regarding the impacts of modern technology in forensic analysis and digital investigation. It will also raise awareness about the importance of modern technology as a vital tool for law enforcement agencies worldwide. This study will realize

SDG number sixteen (16), which is peace, justice, and strong institutions, where its goal is to foster peaceful, inclusive societies, ensure justice, and build effective institutions aligning with human rights principles to prevent conflict, protect individual rights, and prevent mistreatment of vulnerable groups (United Nation, 2016).

## **METHODS**

This section presents the methods utilized in this study, including the research participants, instruments, design, and procedure.

### **Design and Procedure**

In this study, the researcher employs a qualitative phenomenological approach that examines people's daily experiences while putting aside the researchers' prior conceptions about the phenomenon. Phenomenological research examines lived experiences to learn more about how individuals interpret those experiences (Delve & Limpaecher, 2022). This approach aims to produce detailed descriptions of the phenomenon and seek reality from people's narratives of their experiences and feelings. Studies using phenomenological research methods in educational contexts typically capture participants' perceptions, emotions, and real-life experiences related to a phenomenon (Yüksel & Yıldırım, 2015).

This study follows the essential procedures for conducting research studies. After verifying and validating the interview questionnaires, the researchers prepared a letter addressed to the respondents asking for their permission to conduct the study and their consent to participate. The researchers utilized a purposive sampling technique by choosing participants from a specific population. They selected a certain set of subjects or individuals to examine. Members are selected "on purpose," not randomly (Dovetail Editorial Team, 2023). In addition, they deliberately look for people with specific characteristics, backgrounds, or attributes related to the research. Moreover, in the interview, the researchers read the questions from the interview guide questionnaire and documented the participants' responses using a voice recorder. Upon the completion of the study, the researchers would keep the study and give an additional copy to the organization where the study was done.

### **Research Instrument**

In conducting the survey and interview, the researcher would utilize an interview questionnaire and a voice recorder to gather the data. The researchers formulated an interview questionnaire for the participants, which would undergo validation from the panel of experts to inquire for guidance with the required enhancement and additional study confirmation. In formulating the questionnaire, the researchers used an open-ended question to allow participants to provide thoughtful, in-depth answers and to express their full knowledge, feelings, and comprehension. Interviews are conducted individually and face-to-face to ensure focused interactions and a personalized assessment procedure. The full response to this question is not restricted to a list of possibilities.

### **Study Participants**

The participants of this study are limited to the police officers assigned within the forensic facility located in Davao City, both male and female, who had already rendered seven (7) years of active service inside the agency. The researchers would look for forensic experts and digital investigators assigned to a forensic facility. The researchers utilized a purposive sampling method to select a certain set of subjects or individuals to examine. Members are selected "on purpose," not randomly (Dovetail Editorial Team, 2023). Furthermore, it has been decided that the researchers would choose a maximum of 7 numbers of participants since they aim to collect a deeper understanding of their experiences, and it has previously

been suggested that using fewer than 20 participants during a qualitative research study will result in better data (Crouch & McKenzie, 2006).

In conducting the study, the participants are oriented on the purpose and significance of the study, and the informed consent procedure is explained, stressing that participation is completely optional and that participants can back out at any moment without facing any penalties. They are informed on how data will be collected, stored, and analyzed, and their confidentiality and anonymity will be ensured. They are given ample time to ask any questions they may have.

### **Ethical Consideration**

The researcher must fully observe the ethical standard in conducting the research following the study protocol assessments and standardized criteria, particularly in managing the population and data such as, but not limited to.

**Voluntary Participation.** All the research participants are informed of what to do and what the research study is about, and they are not subject to coercion or undue influence. Assuring the participants that their privacy is confidential and that participants have the free will to choose to be part of the research study or decline to participate.

**Privacy and Confidentiality.** The respondent's identities are secured and confidential to safeguard their privacy. In order to prevent the disclosure of personal information without the express consent of the subjects, researchers should take precautions to safeguard and anonymize data.

**Informed consent process.** Before consenting to participate, participants must be formally informed about the study's nature, goals, and potential risks.

Coercion should not be used to get informed consent. Participants must be provided with a researcher's questionnaire and research overview, given the time to consider their participation options and be allowed to withdraw from the study at any time. In addition, the panels already reviewed the questionnaire before the researcher conducted the survey and interview.

**Risk.** The study did not involve high-risk situations that may create problems and concerns in all aspects of humans, such as physical, psychological, emotional, and socioeconomic.

**Bio-safety.** We use expert techniques, safety equipment, and carefully thought-out procedures to guarantee that the participants, the Community, and the environment are safeguarded from any cause and harm. The researchers should not do continuous experimentation that could put others at risk.

### **Trustworthiness of the study**

In analyzing the research's trustworthiness titled "The Evolving Landscape of Criminal Investigation: Exploring the Impact and Efficiency of Modern Technologies in Forensic Analysis and Digital Investigations," we consider several factors. The researchers evaluate the authors' credentials and affiliations and check if the study is published in a reputable, peer-reviewed journal. Ensure the study contains a thorough literature evaluation, valid research methodology, and reliable data and evidence. Furthermore, check for potential biases, transparency in the methodology, proper citations, and any available peer feedback.

## **RESULTS AND DISCUSSION**

This section delves into the data gathered, analyzed, and interpreted by the research proponents and data analyst with a research questionnaire provided to the informants during the in-depth interview. The researchers conducted the interview exclusively with seven (7) forensic experts assigned within the forensic facility located in Davao City. The researchers used codes and fictional names to ensure and

maintain each respondent's individual confidentiality, personal privacy, and identity.

**Lived Experiences of Forensic Experts**

Based on the findings from the data obtained, two themes revolved around the lived experiences of forensic experts. The themes were Undergoing Rigorous Training in Achieving Mastery and Skillfulness and Experiencing Challenges that Test Knowledge and Skill Sets.

**Table 1.**  
**Major themes and core ideas on the lived experiences of forensic experts.**

Major Themes	Core Ideas
<i>Undergoing Rigorous Training in Achieving Mastery and Skillfulness</i>	They must undergo and complete comprehensive training to achieve expertise in their fields.
<i>Experiencing Challenges that Test Knowledge and Skill Sets</i>	Even with thorough training, examiners sometimes face complex challenges that <u>would test their expertise.</u>

**Theme 1: Undergoing Rigorous Training in Achieving Mastery and Skillfulness**

From the results that were gathered, forensic experts undergo rigorous training to achieve mastery and skillfulness. They are engaged in comprehensive training in order to be experts in their own field. Apollo and Tigre attended different workshops, seminars, and even schooling to stay updated on the new techniques and methods of conducting forensic analysis.

*“Nag training ko ug basic fingerprint identification course sulod sa unom ka bulan, gisundan og AFIS training, unya nag-training sad ko sa Japan bahin sa AFIS.” (Apollo)*

*“I trained in a basic fingerprint identification course for six months, followed by AFIS training, and then I also trained in Japan regarding AFIS.” (Apollo)*

*“Ang aking training is katong basic sa PNP, basic recruitment, and then naa koy SOCO course or ka nang ginatawag na basic SOCO course, and after that is the basic DNA course.” (Tigre)*

*“My training consists of the basic PNP training, basic recruitment, and then I have a SOCO course, or what's called a basic SOCO course, and after that is the basic DNA course.” (Tigre)*

This means that forensic experts invest their time in learning new techniques they can use in their examination that will make them experts in their own fields. In the study of Armenta (2023), forensic professionals can enhance their knowledge and proficiency through ongoing training and attending conferences, workshops, and programs, thereby enhancing their analytical and interpretative abilities and enabling more accurate and trustworthy forensic analysis. Likewise, Panther also attested:

*“Para mahimong PI o fingerprint examiner, kinahanglan gyud mi ug taas nga training like 3 months of training, labi na sa among specialization. Bago ana, dapat mi maka take ug SOCO course.” (Panther)*

*“To become a PI or fingerprint examiner, we really need extensive training, like 3 months of training, especially in our specialization. Before that, we need to take a SOCO course.” (Panther)*

This proves that continuing education is really crucial for crime laboratories to provide optimal service to the criminal justice system, ensuring forensic scientists stay updated with new technology, equipment, methods, and techniques (Justice, 2019). In addition, this training provides them with new learnings and methods that they will be able to apply in their investigative process and forensic analysis. More so, this aids them in following set procedures, reducing mistakes, and producing work of the greatest quality (Armenta, 2023).

**Theme 2: Experiencing Challenges that Test Knowledge and Skill Sets.**

From the results gathered, the participants experience challenges that test their knowledge and skills. In their everyday work, they encountered situations that test their level of capacity. As stated by Panther, despite the fact that they have undergone thorough training, some forensic experts still find it difficult.

*“Pagka-examiner nako, baguhan pa, unya ang una nako nga gi-examine, bullet trajectory, lisod diay. Abi nako sayon kay sukod- sukod lang sa mga buslot. Lisod kay usahay dili makita ang exit.” (Panther)*

*“When I became an examiner, still a novice, the first thing I examined was bullet trajectory, and it turned out to be difficult. I thought it would be easy because it was just measuring the holes. It's difficult because sometimes the exit hole is not visible.” (Panther)*

Moreover, some forensic experts face challenges related to handling people, ethical issues, and, particularly, challenges in evidence collection used in their examination. This can be attributed to the response of Tigre and Aqua.

*“Ang problema kay kung dili sakto ang pagkuha ug pag-store sa ebidensya, kay nay degradation mahitabo, mao nga dili klaro ang resulta.” (Tigre)*

*“The problem is that if the evidence is not properly collected and stored, degradation will occur, making the results unclear.” (Tigre)*

*“Ang akong mga challenges sa trabaho kay una, damaged ang dokumento, mura'g nabasa, unya doble ang letra. Ikaduha, kanang situation nga kulang ang exemplar which is ang original nga sinulat, nga kinahanglan para sa comparison.” (Aqua)*

*“My challenges at work are. First, the document is damaged; it looks like it got wet, and the letters are doubled. Second, the situation where the exemplar, which is the original writing needed for comparison, is missing.” (Aqua)*

This means that forensic experts must receive thorough training and knowledge for their work. It enables them to increase their professional network, acquire new skills, and broaden their knowledge base. In addition, ongoing training also provides forums for cooperation, information exchange, and education from seasoned professionals (Armenta, 2023). More so, continuous training plays a pivotal role in their field by helping them avoid encountering issues and problems.

**Advantages and Disadvantages of Modern Technology**

Based on the findings from the data obtained, three themes emerged regarding the advantages and disadvantages of modern technology in forensic experts' work. The theme of the advantages of modern technology was its Aids in Expediting Work and Achieving Efficiency. The themes under the disadvantages of modern technology were the requirement for investment of sufficient resources and the expectation of unquestionable mastery and skills.

**Table 2.**

**Major themes and core ideas on the advantages and disadvantages of modern technology.**

Major Themes	Core Ideas
<i>Aids in Expediting Work and Achieving Efficiency</i>	Modern technology expedites their investigations and increases Efficiency through the use of advanced equipment.
<i>Requires Investment of Sufficient</i>	Modern equipment utilization requires significant investments due

Resources	to its high price.
Expects Unquestionable Mastery and Skills	Sufficient skills and training among examiners are needed to stay updated with the advancements and ensure that their skills are used effectively.

**Theme 3: Aids in Expediting Work and Achieving Efficiency.**

From the results gathered, modern technology impacts forensic experts by expediting their work and aiding them in finishing their work faster without wasting any resources and effort. As Apollo, Marine, and Aqua said, modern technology aids them in accomplishing their examination.

*“Isip fingerprint examiner, dako’g tabang ang AFIS. Kung manual, lisod pangitaon, pero sa AFIS, dali ra ma-identify ang fingerprint.” (Apollo)*

*“As a fingerprint examiner, AFIS is a great help. If it’s manual, it’s hard to find, but with AFIS, the fingerprint can be easily identified.” (Apollo)*

*“Para nako, ang advantage kay dali ma-ila ang suspect kay paspas ang DNA equipment. Pero amo gihapon i-evaluate ang resulta.” (Marine)*

*“For me, the advantage is that the suspect can be quickly identified because the DNA equipment is fast. But we will still evaluate the results.” (Marine)*

*“Dako’g tabang ang modern technology sa among trabaho. Usahay, ang dokumento mura’g limpyo, pero ginagamit namo ang microscope, digital imaging, UV/IR lights, ug high-resolution scanner aron makita ang mga gitagoan nga alterations. Mao nang importante ang technology.” (Aqua)*

*“Modern technology is a great help in our work. Sometimes, the document looks clean, but we use microscopes, digital imaging, UV/IR lights, and high-resolution scanners to see hidden alterations. That’s why technology is important.” (Aqua)*

This proves that technology has impacted practitioners in their examination and investigative process. It allows them to recognize and identify the identity of the victims and suspects more efficiently through virtual and physical reconstruction techniques (Chango et al., 2024). In addition, to fully utilize this modern technology in the use of forensic experts' examination and guarantee an efficient administration of justice, they must understand how important it is to adapt them.

**Theme 4: Requires Investment of Sufficient Resources.**

From the results gathered, the expensive amount of modern equipment required for their investigation and evidence examination is one of the disadvantages forensic experts encounter. This can be attributed to the response of Apollo, Tigre, and Hawk.

*“Kinahanglan nato’g manpower ug budget para ma-maintain ang system. Usahay, mapuno ang memory, mo-lag, ug mag-shutdown ang system. Kinahanglan nato e-refresh ug maintenance.” (Apollo)*

*“We need manpower and budget to maintain the system. Sometimes, the memory gets full, it lags, and the system shuts down. We need to refresh and maintain it.” (Apollo)*

*“Ang problema, kinahanglan ug dako nga puhunan. Ang aircon dili para sa tawo, kundi sa machine aron dili mag-overheat. Dapat pud lig-on nga equipment para dili maguba kung naay power interruption. Kinahanglan kompleto ang institution sa tanan, dili lang machine, pati ang mga kinahanglanon niini.” (Tigre)*

*"The problem is, it requires a large investment. The air conditioning is not for people, but for the machine so it won't overheat. The equipment must also be durable so it won't break down during a power interruption. The institution needs to be complete in everything, not just the machines, but also their requirements." (Tigre)*

*"Ang disadvantages since mahal yun siya pag nasira ang equipment mo we will going back duon sa problems na encounter mo after mo na magkaruon ng improvement." (Hawk)*

*"The disadvantages are that since it is expensive if your equipment breaks, we will go back to the problems you encountered after you made improvements." (Hawk)*

In addition, significant investment is required to implement advanced technologies and financial challenges. Procurement of specialized equipment can be expensive, leading to unequal access to crucial technologies and software (Chango et al., 2024).

**Theme 5: Expect Questionable Mastery and Skills.**

Lack of skills and confidence in using modern equipment is also one of the challenges forensic experts are facing. As said by Marine, the lack of mastery and confidence of an examiner in utilizing modern equipment in its examination impacts the credibility and reliability of evidence.

*"Ang disadvantage kay kung dili sigurado ang examiner sa iyang abilidad, kay kinahanglan master jud ka. Kung masayop, mawala ang credibility and reliability sa usa aka evidence." (Marine)*

*"The disadvantage is that if the examiner is not confident in their ability, you really need to be a master. If you make a mistake, the credibility and reliability of the evidence will be lost." (Marine)*

This implies that confidence among forensic experts plays a pivotal role in the conduct of their examination. Moreover, it is important that forensic professionals undergo continuous training to stay updated with the latest advancements and ensure that their skills are used effectively in analyzing and interpreting evidence (Armenta, 2023).

**Coping Mechanism of Forensic Experts with the Disadvantages**

Based on the findings from the data obtained, two themes revolved around the objective of how forensic practitioners cope with the disadvantages met. The themes under the coping mechanism were continuous training and professional development, as well as self-determination, discipline, and a positive mindset.

**Table 3.**

**Major themes and core ideas on how forensic experts cope with the disadvantages.**

Major Themes	Core Ideas
<i>Continuous Training and Professional Development</i>	Continuous training and learning are essential for examiners to address ongoing challenges.
<i>Self-Determination, Discipline, and Positive Mindset</i>	To cope with the disadvantages, forensic experts must be confident in what they do and trust themselves. In addition, they must gather more experience.

**Theme 6: Continuous Training and Professional Development.**

From the results gathered, forensic experts cope with the disadvantages met by engaging and investing their time in different trainings and workshops, which can be linked to the study of Armenta (2023),

which states that continuous training fosters professional development by expanding the professional network, fostering knowledge sharing, and fostering collaboration among forensic professionals. As said by Tigre and Aqua, they are still undergoing different trainings because of the new methods and techniques introduced by this modern technology.

*"Naga training gihapon mi and gina-train namo ang SOCO sa saktong pagcollect and storing evidences, labi na ang biological, kay bag-o pa ang DNA." (Tigre)*

*"We are still training, and we are training the SOCO on the proper collection and storage of evidence, especially biological because DNA is still new." (Tigre)*

*"Nalagpasan nako tong mga challenges na akong na encounter through applications atong mga learnings gud nga na acquire nako on my college days, and by acquiring or receiving trainings." (Aqua)*

*"I overcome those challenges I encountered through applying the learnings I acquired during my college days, and by acquiring or receiving training." (Aqua)*

In addition, as stated by Armenta (2023), constant training helps forensic practitioners stay informed about the changes and how they can adapt their practices accordingly. This means that continuing training aids forensic experts

by enabling them to stay updated with the new advancements. Moreover, they need to be fully equipped and knowledgeable in addressing future challenges.

**Theme 7: Self-Determination, Discipline, and Positive Mindset.**

From the results gathered, self-determination, discipline, and a positive mindset play a crucial role in how forensic professionals cope with the challenges and disadvantages they've met; as said by Levi and Panther, forensic examiners should have 100% self-confidence and gather more experience.

*"Para nako, isip polygraph examiner, dapat maayo ka, skillful ug dili magpadaog sa kahadlok. Dapat 100% ang pagsalig sa kaugalingon." (Levi)*

*"For me, as a polygraph examiner, you should be good, skillful, and not succumb to fear. There should be 100% self-confidence." (Levi)*

*"Pagtigom og experience. Dapat mag try ka unsaon pag-examine, ayaw kahadlok. And imong learnings kay dapat imo jud gamiton." (Panther)*

*"Gather experience. You should try how to examine, don't be afraid. And your learnings should really be used." (Panther)*

More so, these traits are one of the coping mechanisms forensic experts utilize in order to cope with the disadvantages.

**Insights from their Experiences**

Based on the findings from the data obtained, two themes revolved around the objective regarding what insights we can learn from the experiences of forensic experts. The two themes were Dedication to hard work through Passion and Commitment and Continuing the Learning Process and Self-Improvement.

**Table 4**

**Major themes and core ideas on what insights we can learn from their experiences.**

Major Themes	Core Ideas
<i>Dedicating to hard work through Passion and Commitment</i>	Forensic experts must possess both passion and Dedication.

<i>Continuing the Learning Process and Self-Improvement</i>	They continuously learn to broaden their knowledge and to ensure that they are still capable to adapt with the advancements.
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**Theme 8: Dedicating to hard work through Passion and Commitment.**

From the results gathered, being a forensic expert involves more than just a job; it requires passion and unwavering Dedication. This can be attributed to the response of Tigre and Hawk.

*"Ang insights nga akong mahatag kay gamita gyud ang investigative eye, ayaw pagsalig lang sa natun-an, mag-research, pangita sa possible sa crime scene, himoa'g interest ang trabaho. Dili ra ang gitudlo." (Tigre)*

*"The insights I can provide are to really use the investigative eye, don't just rely on what you've learned, do research, look for possibilities at the crime scene, and make the job interesting. It's not just what is taught." (Tigre)*

*"Ang pag ta-trabaho it is about passion, may kasabihan nga tayo if you love your job, then your job will protect you, hindi lang yung dedication support, you have to do research on your own."(Hawk)*

*"Work is about passion; there's a saying that if you love your job, then your job will protect you. It's not just about dedication and support, and you have to do research on your own."(Hawk)*

Moreover, Mohitm (2023) stated that forensic science demands analytical thinking, attention to detail, and a commitment to truth, requiring a passion for unraveling mysteries and a diverse set of skills for success. In addition, being a forensic expert is not just all about passion; it also requires a set of skills and proper training.

**Theme 9: Continuing the Learning Process and Self-Improvement.**

From the results gathered, it is important for forensic examiners to continue learning, even if they are already knowledgeable enough. This can be attributed to Aqua and Marine's response.

*"Ang akong advice lang is dapat walay pagduhaduha sa kaugalingon, dapat confident ka, ug kinahanglan ang mga trainings aron mahimong maayong examiner." (Aqua)*

*"My only advice is that you should have no doubts about yourself, you should be confident, and you need training to become a good examiner." (Aqua)*

*"Never stop learning lang, and as an examiner constant dapat nga maga tuon, kanang dapat flexible and dali gud ka maka adapt sa changes, maong dapat maka acquire jud ka ug mga trainings." (Marine)*

*"Never stop learning, and as an examiner, you should constantly study, be flexible, and quickly adapt to changes, so you really need to acquire training." (Marine)*

The study conducted by Armenta (2023) stated that continuous training enhances forensic practitioners' professional development by broadening their knowledge, developing new skills, and expanding their network, ensuring they stay updated with the latest advancements in evidence analysis.

**IMPLICATION OF THE STUDY AND PRACTICE**

This section presents the findings derived from the study participants' responses and provides recommendations in consonance with the information acquired through the respondent's experiences in the law enforcement organization, specifically in the Forensic Unit.

Modern technology impacts or shapes the field of forensic investigation both positively and negatively. As modern technology becomes increasingly prevalent, institutions and other sectors are forced to adapt

and utilize this advancement. In the field of criminal investigation, specifically under the forensic unit, modern technology greatly impacts their way of conducting investigations and examinations. Based on the results of the findings, modern technology impacts them by changing their investigative process in a way that they don't always conduct their examination manually but with the aid of modern equipment brought by this advancement. More so, it allows them to expedite their work and administer justice more efficiently.

In contrast to that, this advancement also poses different challenges and struggles to forensic experts. From the data obtained, some of the existing challenges they encounter in utilizing this modern technology are financial challenges. The study by Chango et al. (2024) states that acquiring specialized equipment can be too expensive, resulting in discrepancies in access to crucial technology between forensic labs. Furthermore, another challenge encountered by forensic experts is the lack of understanding of forensic experts when it comes to the adaption and integration of this technology. The lack of understanding hinders experts in unlocking the full potential of this modern technology. The law enforcement community's lack of understanding leads to a lack of knowledge about the benefits and applications of technology services, delaying their acceptance and negatively damaging the effectiveness and Efficiency of using new technologies in the forensic sector (Chango et al., 2024). Moreover, insufficient training is another existing challenge. Lack of training among forensic experts directly affects the reliability and credibility of evidence and will result in other ethical and legal challenges. Proper training is a must in the field of forensics, and there is no room for mistakes. That's why acquiring proper training provides new learning's and methods to forensic experts that they will be able to apply in their investigative process and forensic analysis. More so, this will aid them in following set procedures, reducing mistakes, and producing work of the greatest quality (Armenta, 2023).

Moreover, continuous learning, investing their time in different pieces of training, being confident and determined, and having an optimistic mindset are the keys for forensic practitioners to how they are able to overcome the challenges and struggles they encounter. Furthermore, being passionate and dedicated to their work is one of the mechanisms that keep them excelling in their own fields.

Furthermore, the impact of modern technology in forensic analysis and digital investigation among forensic experts holds a significant implication for law enforcement agencies. This suggests that adapting and integrating this advancement will significantly improve their investigative process. Furthermore, the institution must invest in continuous training of seasoned forensic experts and even newly hired forensic examiners to ensure that they are knowledgeable and able to adapt effectively to utilizing this modern technology. In addition, law enforcement institutions must dedicate sufficient resources to maintaining advanced forensic technologies.

The researchers concluded that there is a significant increase in accuracy in forensic analysis, enhancing evidence and case resolutions because of this modern technology. However, it also raises concerns about the high cost of crime laboratory equipment and the importance of continuous training among forensic experts.

**To the Philippine National Police (PNP) Budget**, there must be enough allocated funds for the procurement of high-end modern crime laboratory equipment in all Forensic Group Units to ensure the reliability and credibility of the evidence examined by the forensic experts. Furthermore, more forensic laboratories should be built so that there would be a fair division of workloads and backlogs would be avoided, which would hinder the pursuit of justice. In addition, we suggest dedicating sufficient funds which will be allocated for the training and professional development of each forensic practitioner. By

putting this suggestion into practice, the government will show its Dedication to promoting a strong law enforcement institution and a more resilient and proficient law enforcement workforce.

**To the Community**, especially to the youth, adults, and other social sectors, availing legal services offered by forensic experts is one of the contributions we can give to them. In addition, they may engage actively with law enforcement agencies in the Community to foster mutual understanding and positive relationships, appreciating the valuable contributions made by forensic experts.

**To the Regional Forensic Unit 11**, the field of forensic science is always changing; always move forward and make a commitment to continuing your professional development. Consistently attend conferences and workshops and keep abreast of emerging techniques and technology. Be truthful and open in your work.

**To future researchers**, in order to enhance the depth of this study, it would be beneficial to incorporate the perspectives of more individuals from various Davao City neighborhoods. Furthermore, extending the study to encompass the whole Mindanao area would offer a more comprehensive and in-depth investigation of their day-to-day existence. This would make the study more applicable and approachable to a larger audience by providing a deeper and more comprehensible description of their varied experiences.

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