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BOOK OF PROCEEDINGS

Theme

Innovative and Emerging Technology for Transformative Research and Sustainable Development

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FOREWORD

It is with great pleasure that I present the proceedings of the 2024 Annual Conference of the School of Postgraduate Studies, Enugu State University of Science and Technology (ESUT), held from the 15th to 16th of October, 2024. This year's conference, themed *"Innovation and Emerging Technology for Transformative Research and Sustainable Development,"* brought together a vibrant community of scholars, researchers, policymakers, and industry experts to engage in thoughtful discourse and share groundbreaking insights.

In an era defined by rapid technological advancement and pressing global challenges, the relevance of this theme cannot be overstated. The intersection of innovation and technology with sustainable development presents both opportunities and responsibilities for the academic and research communities. As institutions of higher learning, we must not only adapt to the shifting technological landscape but also lead in harnessing its potential for positive societal transformation.

The papers and presentations featured in this volume reflect a diverse and multidisciplinary approach to contemporary issues, showcasing research that is not only forward-thinking but deeply rooted in the urgent needs of our society. From artificial intelligence and biotechnology to sustainable energy systems and digital transformation in education, the contributions herein exemplify the transformative power of research when aligned with innovative thinking and purposeful action.

I commend all contributors for their scholarly rigor and commitment, and extend sincere gratitude to the organizing committee, reviewers, and all who made this conference a resounding success. It is our hope that the ideas and findings shared in these proceedings will inspire continued inquiry, collaboration, and impactful innovation across disciplines.

Let this conference serve not only as a reflection of our current pursuits but as a call to further action in shaping a future driven by knowledge, creativity, and sustainable progress.

Professor Charles C. Chime
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UTILIZING DIGITAL TOOLS TO ENHANCE CRIMINOLOGY EDUCATION IN 21ST CENTURY ERA

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ABSTRACT

In this 21st century era, technology is pervasive and indispensable. The extensive use of digital tools denotes a significant advancement in the process of teaching and learning of criminology education. By incorporating these digital tools such as crime databases, digital crime-mapping systems, virtual reality (VR), Artificial intelligence (AI) and E-learning platforms, educators can offer a more holistic and experiential learning process in studying crime. This study was guided by three objectives of the study, three research questions, structured questionnaire and indepth interviews. Secondary data for the study was gathered from textbooks, magazines, newspapers, journal and internet materials. A population of 3,200 people was drawn from three tertiary institutions located in Enugu metropolis. Stratified and purposive sampling techniques with a sample size of 160 respondents were used. Constructivist learning theory was the sociological theory adopted for the study. Using descriptive survey research methods, the findings of the study state that students using digital tools reveal greater confidence and preparedness in their ability to tackle modern crime challenges and real-world scenarios, it was indicated that digital tools help students connect theoretical concepts to practical applications in criminology education, pointing out that students participate more and show enthusiasm in class discussion when digital tools are integrated into their course work, compared to the traditional approach. Conclusively, this study provides compelling evidence for the necessity of adopting digital technologies in criminology education to ensure that graduates are well equipped for success in an increasingly digital and complex criminal system. Based on these findings, the study recommends that educational institutions should provide training and development to educators to expose them to the latest digital tools, and also integrate varieties of digital tools into the criminology curriculum to help students to improve in understanding contemporary crime issues

Keywords: Criminology education, Digital tools, Criminal Justice System, 21st century era, innovative approaches

INTRODUCTION

In the traditional methods of teaching, educators were considered the sole providers of knowledge in the classroom, students, on the other hand, were seen as passive receivers of this knowledge. Students assumed a passive role, serving as the silent recipients of instruction while teachers held the central position of attention and focus. Traditionally, criminology education relied heavily on textbooks, lectures and case studies, limiting the practical application of theoretical knowledge (Reichel, 2018). Today, the current emphasis on teaching and learning processes has undergone a significant transformation where the students are the central focus. In Criminology, a discipline rooted in understanding crime, criminal behaviours and justice systems, the use of digital tools have opened up new avenues for both the students and educators to engage with course materials in ways that were previously unimaginable (Lupton, 2014).

The emergence of digital technologies has revolutionized education across various

trends and issues, staying abreast of these trends, criminology education continue to prepare students for the challenges and opportunities of the 21st century (Martin, 2014). Criminology education is essential for anyone who wants to work in criminal justice system or pursue a career in crime prevention or research, this is because it provides the students with the knowledge and skills they need to understand the complex causes of crime and develop effective strategies to prevent and control it. Criminology education is constantly evolving to keep pace with the changing nature of crime and the criminal justice system, they do this by adopting new technologies such as virtual reality, crime databases, digital crime mapping and artificial intelligence which are being incorporated into criminology education to provide students with the skills they need to succeed in the 21st century workforce (Mckee and Meyer, 2020).

Digital tool refers to the different software applications, online platforms and technologies that make tasks easier, enhance productivity, support learning and communication in digital format. In criminology education, digital tools include: crime databases, crime mapping systems, E-learning platforms, artificial intelligence and virtual learning. Criminology education reflects broader trends where digitalization has enhanced access to learning materials and made education more interactive. Payne and Hadzhidimova (2020) emphasize that technologies have allowed students engage with real-time date and virtual environments that mimics the complexities of crime scenes and criminal investigations.

E-learning: These refer to online systems that provide educational content and facilitate learning through digital means. E-learning platforms have expanded access to criminology education, especially in region where traditional educational institutions are inaccessible. E-learning platforms promote interactive learning where students can participate in discussions, engage in peer reviews and receive real-time feedback from instructors. The rise of E-learning platforms like moodle and canvas have facilitated a more flexible approach to criminology education making it accessible globally (Lupton, 2014). The shift towards online education enhances flexibility, thereby allowing students to study at their own pace, which are mostly vital for adult learners who balance education with work and family. Lupton (2014) points out that e-learning helps to support diverse learning styles by offering multimedia content such as videos, infographics and podcasts.

Virtual Reality (VR): This refers to a computer-generated simulation that immerses users in a three-dimensional environment, allowing them to interact with the environment if they were physically present. Virtual Reality is becoming an essential tool for criminology education which allows the students to virtually experience crime scenes, practice forensic analysis and conduct mock trials. Virtual Reality offers a risk-free environment where students can explore and make decisions without the real-world consequences, fostering a deeper understanding of criminal investigation and procedures.

Crime database: This refers to organized collection of data related to criminal activities, offenders, victims and the criminal justice system. Crime database could be used by law enforcement agencies, researchers and policy makers to analyze crime trends, track criminal behaviour and support investigations. Examples of crime database are National Crime Information Center (NCIC) and Uniform Crime Reporting Program (UCR).

Digital Crime Mapping Systems: This has been a game changer in criminology education because it allows students to study crime patterns across different geographic regions, identifying trends in criminal behaviours and predicting potential crime hotspots. Digital crime mapping systems employ Geographic Information Systems (GIS) to visualize crime data on maps. This system allows users to analyze spatial patterns of crime and assess the effectiveness of policing strategies. Examples are Heat maps and Interactive maps.

Artificial Intelligence (AI): This refers to computer systems that simulate human intelligence to perform tasks that typically require human recognition. In criminology, artificial intelligence tools such as facial recognition software and Natural Language Processing (NLP) systems could be used in classrooms to teach students about the ethical and practical implications of these technologies in criminal investigations. Artificial intelligence tools could analyze vast amount of data quickly and provide predictive insights into criminal behaviour, crime trends and effective policing strategies.

Criminal Justice System is a structured network of government institutions and practices designed to uphold social control, provide fair treatment to offenders, enforce laws, ensure public safety and deliver justice to people (Martin, 2014). Criminal justice system operates at local, State and federal levels which involve a multi-step process to manage individuals who have committed crime or suspected of committing crimes. The criminal justice system involves law enforcement agencies, courts, correctional facilities and community services, all working together to uphold legal standards and the primary goals of ensuring justice to victims, offenders and society at large. One of the branches of criminal justice system is the law enforcement agencies, such as the police. Law enforcement agencies are seen as the first point of contact in the criminal justice system. They are charged with the responsibilities of investigating crimes, apprehending suspects, collecting evidence and maintaining public order. They act as the gatekeepers of the system y deciding which cases move forward into the judicial process (Martin, 2014). Another branch of criminal justice system is the courts. They are charged with the responsibilities of adjudicating disputes and determining the guilt or innocence of individuals charged with crimes (Siegel and Worrall, 2019). This branch of criminal justice system upholds the legal rights of the accused, ensure fair trials and apply the law impartially.

Corrections (Prisons, Probation and Parole) is another branch of the criminal justice system.

They are charged with the responsibilities of sentencing the convicted individuals to incarceration, probation or to other corrective measures. Correctional facilities such as prisons and jails are designed to detain and rehabilitate offenders while probation and parole offer alternatives to incarceration with supervised freedom (Reichel, 2018). Juvenile justice system is another branch of criminal justice system. The system deals with offenders who are minors. The system is designed to focus more on rehabilitation and education than punishment. Juvenile courts often treat young offenders differently under the belief that early intervention can prevent future criminal behaviour (Siegel and Worrall, 2019). Victims services is a growing branch of criminal justice system. They are charged with the responsibilities of providing services and protecting the rights of victims of crime. These services include legal representation, counseling, restitution and the rights to participate in legal proceedings.

21st Century Era refers to the time period from January 1, 2001 to the present. This era is characterized by rapid advancements in technology, significant social and political changes, environmental challenges and globalization. The 21st century era has introduced a new wave of challenges and opportunities across different sectors of society, from the economy to culture, education, healthcare and governance. The 21st century era is a time of profound change and complexity. The century continues to unfold with ongoing advancements in technology, shifts in global power dynamics and evolving social norms shaping the future.

Innovative approaches refer to creative and modern methods/approaches used to solve problems, improve efficiency and introduce new perspective across various fields. These approaches are increasingly significant in the 21st century due to the rapid pace of technological advancements, shifting societal needs and challenges posed by globalization and environmental concerns (Mckee and Meyer, 2020). Innovative approaches are shaping the future across all sectors by addressing current challenges in novel and creative ways. Whether through digital tools,

sustainability efforts or personalized services, these innovations are enhancing efficiency, accessibility and adaptability in response to the changing world.

The integration of digital tools into criminology education provides a multidimensional learning experience, allowing students to engage more deeply with criminology theory and practice. Siegel and Worrall (2019) argue that those digital tools not only improve knowledge retention and analytical skills but also prepare students for real-world applications by exposing them to the technologies currently used in criminal justice system.

Theoretical Framework

The best theory that suits the topic under study is Constructivist Learning Theory. The proponents of this theory are Jean Piaget and Lev Vygotsky. The main tenet of this theory is that it posits that learners construct knowledge through active engagement and interaction with their environment. This theory emphasizes that learning is most effective when students are actively involved in real-world problem-solving and critical thinking rather than passively receiving information. Constructivist learning theory emphasizes that knowledge is built through active exploration, which aligns with the use of digital tools to simulate real-world criminology scenarios. Constructivist learning theory supports the integration of digital tools in criminology education by emphasizing the value of interactive,

practical and student-centered learning which enhances critical thinking and real-world problem-solving.

Methods

The research design for this study was descriptive survey research design. This study was carried out in three tertiary institutions located in Enugu Metropolis, Enugu State. The population of this study was 3,200 people with a sample size of 150 respondents for quantitative study and 10 participants (indepth interview) for qualitative study. Stratified random sampling techniques was used to select students by their academic year (eg: first, second and third year criminology students) to ensure a diverse representation across different levels of academic experience. Educators (indepth interview) were selected purposively, based on their experiences with digital tools in teaching criminology education. A structured questionnaire was used for data collection for the quantitative study which consists of 15 items in two sections, 5 items in section A which represents the personal data of the respondents while 10 items in section B which represents the substantive issues of the study derived from the research questions. Frequencies and percentages were used to analyze the data collected from the field.

Results

Research Question one: What is the impact of digital tools on students' ability to understand and investigate modern crimes in 21st century era?

Table 1: Impact of digital tools on students' abilities

S/No	Responses	Frequency	Percentage
1	Enhances Problem solving skills.	8	5.3
2	Improves students abilities and learning outcomes by enhancing engagement, providing access to real-time information and interactive learning	120	80
3	Improves students knowledge retention	10	6.7
4	Develops students' critical thinking abilities & analytical skills	12	8

Source: Field survey, 2024

Responses from table one above indicate that over half of the respondents, representing 80% believe that the impact of digital tools on students' abilities do not only improve

students' learning outcomes but also enhance their engagement in classroom activities and improve their interaction in teaching and learning. Their engagement and interactive

learning abilities make them to do better wherever they find themselves. This is followed by other respondents, representing 8%, 6.7% and 5.3% respectively, who have different opinions towards how digital tools could impact on students' abilities

Research Question Two: How will the use of digital technologies help bridge the gap between theoretical knowledge and practical application in criminology education in 21st century era?

Table 2: Use of digital technologies to bridge gap between theoretical knowledge and practical application

S/No	Responses	Frequency	Percentage
1	Helps students to engage in Problem solving skills.	18	12
2	Prepares students for real-world applications by exposing them to the technologies currently used in criminal justice system.	92	61.3
3	Enables students to work in teams, solving complex problems.	16	10.7
4	Help students to apply theoretical knowledge to their research interests.	24	16

Source: Field survey, 2024

Responses from table two above indicate that over half of the respondents, representing 61.3% believe that the use of digital technologies could bridge the gap between theoretical knowledge and practical application because it prepares the students for real-world applications by exposing them to technologies currently used in criminal justice system, which will help them function better in the workforce. This is followed by other respondents, representing 16%, 12%

and 10.7% respectively, who have different opinions towards how the use of digital technologies could bridge the gap between theory and practical.

Research Question Three: How can the use of digital tool associate with the students' engagement and motivation than the traditional lecture-based methods in 21st century era.

Table 3: Comparing the use of digital tools to traditional lecture-based methods in 21st century era

s/no	Responses	Frequency	Percentage
1	Helps students to learn at their own pace	22	14.7
2	Makes students passive in classroom situations	19	12.7
3	Enhances students' interaction, collaboration and flexibility in classroom situations.	86	57.3
4	Students rely heavily on textbooks which does not promote dynamism in education.	23	15.3

Source: Field survey, 2024

Responses from table three above indicate that over half of the respondents, representing 57.3% believe that the use of digital tools could not be compared to the traditional lecture-based methods in 21st century era because it enhances the students' interaction and collaborations in classroom situations and also encourages flexibility in teaching and learning. This is followed by other respondents, representing 15.3%, 14.7% and 12.7% respectively, who have different opinions towards the comparisons between

use of digital tools and traditional lecture-based methods in 21st century.

Discussion of Findings
The findings in respect to research question one indicate that the impact of digital tools on students' abilities do not only improve students' learning outcomes but also enhance their engagement in classroom activities and improve their interaction in teaching and learning. The researcher observes that the students' engagement and interactive

learning abilities make them to do better wherever they find themselves. This could be explained in line with Mckee and Meyer (2020), they observe that students are exposed to significant improvements in critical thinking and problem solving abilities when taught with digital technologies. This finding suggests that the digital tools are not only beneficial for teaching and learning but also to foster analytical and cognitive skills to solving complex crime scenarios and for effective crime analysis and investigation.

Findings in regard to research question two indicate that the use of digital technologies could bridge the gap between theoretical knowledge and practical application because it prepares the students for real-world applications by exposing them to technologies currently used in criminal justice system, which will help them function better in the workforce.

This could be explained in line with Martin (2014), who points out that student who are trained using digital tools are better equipped to enter the workforce and readiness to meet industry expectations, especially in fields that require digital forensics, cybercrime and data-driven investigations. This could also be explained by Lupton (2014), who argues that students who use digital tools in their criminology education are better able to apply theoretical knowledge to practical crime cases and the demands of modern crime investigation. This finding highlights the necessity for criminology education to incorporate the latest technological advancements to ensure that their graduates are competitive and capable in a rapid changing crime landscape.

The findings in respect to research question three indicate that the use of digital tools could not be compared to the traditional lecture-based methods in 21st century era because it enhances the students' interaction and collaborations in classroom situations and also encourages flexibility in teaching and learning. This could be explained in line with Reichel (2018), who points out that students who are exposed to digital tools in criminology education demonstrate deeper

understanding of modern crime patterns compared to those taught using traditional lecture-based methods. This finding highlights that students trained with digital tools will report higher confidence and preparedness by displaying critical thinking, analytical reasoning and problem solving skills.

Conclusion

The study on utilizing digital tools to enhance criminology education in the 21st century underscores the transformative impact of technology on learning experience. The findings reveal that digital tools significantly improve students' understanding of modern crime trends, such as cybercrime and digital forensics, while also enhancing critical thinking, problem-solving and real-world application of criminological theories. These tools increase students' engagement, motivation and preparedness for careers in criminal justice system, aligning with the demands of the rapidly evolving crime landscape. As the criminal justice system becomes increasingly reliant on digital technologies, it is crucial to equip students with the necessary skills to address contemporary crime challenges, thereby contributing to more innovative and effective crime prevention, investigation and resolution in this 21st century era.

Recommendations

Based on the findings of the study, the following recommendations were proposed:

1) Educational institutions should provide training and development to educators to expose them to the latest digital tools, and also integrate varieties of digital tools into the criminology curriculum to help students to improve in understanding contemporary crime issues.

2) Educational programs should prioritize practical learning experiences such as internships and hands-on workshops where the students can apply their knowledge of digital tools to real-world settings, to enhance their skills and preparedness for the workforce.

3) Institutions should implement continuous assessment methods to evaluate the

effectiveness of digital tools in enhancing student learning outcomes, regular feedback

will help to define the use of these tools to ensure they meet educational goals.

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