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Technological and Pedagogical Knowledge in Relation to Teaching Proficiency among Criminology Faculty

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Abstract. The transition from traditional face-to-face to online learning as an alternative course during the pandemic shifts different factors toward educators. This study determined the technological and pedagogical knowledge about teaching proficiency among criminology faculty. Quantitative research using a descriptive-correlational design involved 103 respondents from the selected schools offering criminology programs in the province of Misamis Oriental who were selected through purposive sampling. The instruments used in this study were the Technological Survey Questionnaire, the Pedagogical Survey Questionnaire, and the Teaching Proficiency Evaluation adopted from Witting. The findings showed that most of the respondents were young adults, mostly females with master's degree units, served less than five years and had contractual employment. The level of technological knowledge among criminology faculty was average. Somehow, the level of teaching proficiency among criminology faculty was high. The teachers' technical knowledge of word processing was significant to pedagogy, multimedia to course packages, and basic internet to course packages. Integration, communication technology, and assessment were significantly related to mastery of content and pedagogy. Teachers' motivation was significant to the integration and communication technology; instruction was highly significant to mastery of content, pedagogy, and integration and communication technology. The assessment was significant for mastery of content, pedagogy, and ICT integration. It is recommended that further studies be conducted using strong qualitative tools to investigate deep technological and pedagogical knowledge about teaching competence.

Keywords: Pedagogical knowledge; Teaching proficiency; Technological knowledge.

1.0 Introduction

The pandemic has prompted the development of technological learning approaches to address new challenges and meet the Education System's needs. The pandemic has prompted a global exploration of pedagogical learning strategies, aiming to adapt and create a resilient educational system by combining technology-based learning approaches. All levels of education, from the K12 program to the tertiary education system, are mandated to continue educational classes through diverse platforms and are compelled to adopt online learning. The technology based education, particularly online learning highlights the shift towards online education during COVID-19 pandemic. Accordingly, Oke and Fernandes (2020) affirmed that students from public schools in the 21st generation rely mostly on the influence of technology because it permeates every aspect of their interest and helps them learn. As a result, classroom instruction that relies exclusively on technological pedagogy is acceptable delivery in classrooms nowadays.

The challenges and benefits of online learning and technology-based knowledge are examined, and the importance of adapting teaching methods to suit the online environment is examined. This emphasizes the need for teachers to be flexible and skilled in integrating technology into their teaching practices, determining the significance of embracing technology to enhance student learning outcomes and improve the educational experience. Caena and Redecker (2019) confirmed that teachers adapt teaching practices to different societal events to meet students' changing needs, improve their technological skills, and design appropriate learning activities for their technical competency level.

Integrating information and communication technologies (ICT) in the contemporary educational landscape is paramount. This necessitates a pedagogical approach emphasizing collaboration, communication, and developing 21st-century skills. The effective implementation of ICT in education significantly enhances student learning outcomes. To facilitate this, educators must possess a high level of technological literacy, enabling them to employ diverse pedagogical strategies that leverage the potential of ICT (Stein et al., 2020). Baran and Uygun (2016) confirmed that the Technological Pedagogical Content Knowledge (TPACK) concept underscores the importance of fostering creativity, collaboration, and accountability in learning environments. This framework emphasizes the interconnectedness of content knowledge, pedagogical expertise, and technological proficiency, highlighting the crucial role of teachers in navigating the complex landscape of 21st-century education.

Integrating technology in education, which translates those findings into real-world classrooms, particularly in tertiary education, presents a significant challenge. This would exist because the successful implementation of technology often depends on factors beyond the technology that face difficulties in integrating technology into their teaching practices. This can be due to a lack of training, support, or even resistance to change within the teaching culture. Technology integration can sometimes make teachers feel less effective as they grapple with new tools and approaches introduced to them. This can lead to a sense of frustration and a reluctance to embrace technology fully. Bridging these inquiries requires a deeper understanding of the specific challenges teachers face in tertiary education and developing strategies to address these challenges. This includes providing adequate training, support, and resources to help teachers effectively integrate technology into their teaching practices while fostering a more supportive and adaptable teaching culture (De Vera et al., 2020).

The study identifies the technological and pedagogical knowledge about teaching proficiency among criminology faculty, assessing the online teaching infrastructure and teachers' experience in online-based teaching. It aims to assess the impact of teachers' self-belief in technological and pedagogical knowledge during the pandemic on the teaching and learning process. Further, it explores the relationship between teachers' technological and pedagogical knowledge and their teaching proficiency in law enforcement curricula, understanding how teachers' knowledge and beliefs influence their effectiveness in online teaching.

2.0 Methodology

This study utilized the quantitative approach and the correlational design. It is an inferential analysis of identifying the significant relationships of the dependent variables as influenced by the independent variables. The respondents of this study were the criminology faculty members, both full-time and part-time, from the three selected colleges offering criminology courses. Respondents were selected through complete enumeration methods, with 103 total respondents from Tagoloan Community College having 22 criminology faculty, Misamis Oriental Institute of Science and Technology with 13 criminology faculty, and 68 criminology faculty from PHINMA-Cagayan de Oro College that were hired during the first semester school year 2021-2022.

Instruments were adopted and utilized, including the Technological Knowledge Questionnaire to assess faculty members' technical skills, the Pedagogical Knowledge Questionnaire to evaluate their teaching methods, and the Teaching Proficiency Evaluation tool to assess their overall performance. The study goes through proper channeling of approvals before the distribution of questionnaires to Criminology faculty members via Google Form Survey. Data collection took one to two weeks, with responses tallied using MS Excel for analysis. Through permission from the school's Department Head of Office for teachers' evaluation, confidentiality is ensured through data coding, electronic storage with password protection, and hard copy storage privacy and confidentiality.

Considering the pre-engagement procedure, the conduct of the study should receive all approved letters from the appropriate authorities, including the participant's full consent. Throughout the study, it ensures compliance with the Data Privacy Act of 2012 to protect personal data and other information. The researchers prioritized the dignity of the participants, keeping all information confidential and not disclosing any names to the public.

3.0 Results and Discussion

3.1 Demographic Profile of Respondents

Table 1 presents the demographic profile of the Criminology faculty, indicating that the majority of the respondents are a young, predominantly female group with a majority holding master's degree units and have been in for 1-5 years of service and are employed on a contractual basis. Despite their varied backgrounds, the faculty members exhibit resilience and believe in their teaching abilities. They consider demographic areas as crucial in their teaching pedagogy and proficiency as teachers, enabling them to adapt to changing learning modalities like technology and ensure quality academic performance for their students. The study on teaching proficiency and its effectiveness among faculty members confirmed the importance of age, gender, education, and experience as demographic key factors in enhancing teaching effectiveness (Aban et al., 2020).

Table 1. Descriptive statistics of the profile of the respondents

Variables	Frequency	Percent
Age		
20-25 years old	4	4.00
26-30 years old	25	24.00
31-35 years old	21	20.00
36-40 years old	13	13.00
41-45 years old	13	13.00
46-50 years old	12	12.00
51 years old and above	15	14.00
Sex		
Male	42	41.0
Female	61	59.0
Educational Attainment		
Bachelor's Degree Holder	17	16.00
With Master's Degree Units	48	47.00
Master's Degree Holder	22	21.00
With Doctoral Units	12	12.00
Doctoral Degree Holder	4	4.00
Length of Service		
1-5 years	56	54.00
6-10 years	17	17.00
11-15 years	24	23.00
16-20 years	1	1.00
21-25 years	5	5.00
26-30 years	-	
Type of Employment		
Contractual	74	72.00
Probationary	9	9.00
Regular	20	19.00

3.2 Technological Knowledge Among Criminology Faculty

Table 2 on the level of assessed technological knowledge of criminology faculty members reveals an average overall mean of 3.15 and a standard deviation of 0.65. This demonstrated proficiency in word processing; they showed average skills in basic internet use, spreadsheet preparation, presentations, and multimedia applications. It suggests further training to enhance faculty members' technological skills, especially in areas beyond word processing. The study already confirmed that the areas of technology have revolutionized education across various areas, such as e-learning, interactive learning, and pedagogical and technological aspects. According to Farros (2019), improving the educational process is closely linked to pedagogical knowledge and its application in modern virtual learning environments.

Table 2. Descriptive statistics of the level of technological knowledge among criminology faculty

Construct	Mean	SD	Remark
Basic Internet	3.32	0.48	Average
Word Processing	3.41	0.52	High
Spreadsheets	2.98	0.77	Average
Presentation	3.16	0.71	Average
Multimedia	2.89	0.76	Average
Overall	**3.15**	**0.65**	**Average**

Scale: 4.21-5.00 (Very High); 3.41-4.20 (High); 2.61-3.40 (Average); 1.81-2.60 (Low); 1.00-1.80 (Very Low)

3.3 Pedagogical Knowledge Among Criminology Faculty

Table 3 shows the level of pedagogical knowledge that demonstrates proficiency in motivating students. Further development is needed to set clear objectives, deliver effective instruction, and assess student performance. This highlights the faculty's adaptability to online learning during the pandemic. It also emphasizes the need for continued professional development to enhance their pedagogical skills and meet the evolving demands of online education. De Vera et al. (2021) believe pedagogical competence is essential for quality education. This involves teachers' ability to create effective learning environments, design activities for different learning styles, and employ appropriate teaching strategies.

Table 3. Descriptive statistics of the level of pedagogical knowledge among criminology faculty

Construct	Mean	SD	Remark
Objectives	3.29	0.51	Average
Motivation	3.49	0.48	High
Instruction	3.39	0.34	Average
Assessment	3.30	0.37	Average
Overall	**3.37**	**0.43**	**Average**

Scale: 4.21-5.00 (Very High); 3.41-4.20 (High); 2.61-3.40 (Average); 1.81-2.60 (Low); 1.00-1.80 (Very Low)

3.4 Teaching Proficiency Among Criminology Faculty

Table 4 presents the level of teaching proficiency among Criminology faculty, who possess a high level of teaching proficiency and demonstrate strong skills in content mastery, pedagogy, ICT integration, and assessment. However, they showed average proficiency in developing comprehensive course packages aligned with the institution's vision, mission, and goals. This draws an essential faculty's dedication to delivering quality instruction and their ability to adapt to online learning, which recommends development in creating course packages that fully integrate institutional objectives. Aslan and Zhu (2017) state that a good attitude toward educational technology consistently indicates proficient teaching skills. Effective integration of educational technology into teaching and learning requires a positive mindset.

Table 4. Descriptive statistics of the level of teaching proficiency among criminology faculty

Construct	Mean	SD	Remark
Course Package	3.39	0.36	Average
Mastery of Content	3.59	0.35	High
Pedagogy	3.44	0.40	High
ICT integration	3.42	0.44	High
Assessment	3.56	0.47	High
Overall	3.48	0.40	High

Scale: 4.21-5.00 (Very High); 3.41-4.20 (High); 2.61-3.40 (Average); 1.81-2.60 (Low); 1.00-1.80 (Very Low)

3.5 Difference in the Teaching Proficiency Among Criminology Faculty when Grouped by Profile

Table 5 presents the significant difference in the teaching proficiency among the Criminology Faculty when grouped by Profile, which showed significant differences in teaching proficiency related to age and gender concerning course packages, content mastery, pedagogy, ICT integration, and assessment. As it aged in the experience, this was viewed as more credible than younger instructors due to their years of experience and knowledge in the field. This perception often led to age-related experiences being seen as factors that affect the teaching proficiency of the instructor, ultimately influencing students' perceptions of their abilities. This implies the importance of recognizing and valuing the expertise that comes with age in certain professions. Semlak and Pearson (2008) affirmed that older instructors, with their wealth of experience, are perceived as more credible by students than younger instructors. This credibility stems from their deeper understanding of the subject matter

and effective teaching methods developed over time. As a result, students tend to have higher classroom satisfaction levels and success rates when taught by experienced instructors.

Table 5. Difference in the teaching proficiency when grouped by profile

5.1 Age and:			
Course Packages	F = 2.281*	0.042	Significant
Mastery of Content	F = 0.881	0.512	Not Significant
Pedagogy	F = 1.963	0.078	Not Significant
ICT Integration	F = 1.472	0.196	Not Significant
Assessment	F = 0.608	0.724	Not Significant
5.2 Sex and:			
Course Packages	t = 0.015	0.988	Not Significant
Mastery of Content	t = 2.171*	0.032	Significant
Pedagogy	t = 0.951	0.344	Not Significant
ICT Integration	t = 0.564	0.574	Not Significant
Assessment	t = 2.504*	0.014	Significant
5.3 Educational Attainment and:			
Course Packages	F = 0.686	0.603	Not Significant
Mastery of Content	F = 0.779	0.541	Not Significant
Pedagogy	F = 1.601	0.180	Not Significant
ICT Integration	F = 0.498	0.737	Not Significant
Assessment	F = 1.600	0.180	Not Significant
5.4 Length of Service and:			
Course Packages	F = 0.681	0.606	Not Significant
Mastery of Content	F = 0.545	0.703	Not Significant
Pedagogy	F = 0.738	0.568	Not Significant
ICT Integration	F = 1.127	0.348	Not Significant
Assessment	F = 0.533	0.712	Not Significant
5.5 Type of Employment and			
Course Packages	F = 0.628	0.536	Not Significant
Mastery of Content	F = 1.884	0.157	Not Significant
Pedagogy	F = 0.674	0.512	Not Significant
ICT Integration	F = 0.001	0.999	Not Significant
Assessment	F = 0.396	0.674	Not Significant

Legend: Relationship Strength Scale: 1.00 (Perfect); 0.80-0.99 (Very Strong); 0.60-0.79 (Strong); 0.40-0.59 (Average); 0.20-0.39 (Weak); 0.01-0.19 (Very Weak); 0.00 (No Relationship)
Probability Value Scale: **p<0.01 (Highly Significant); *p<0.05 (Significant); p>0.05 (Not significant)

3.6 Relationship Between Technological Knowledge and Teaching Proficiency Among Criminology Faculty

Table 6 presents the significant relationship between Criminology faculty's technological knowledge and their teaching proficiency. This shows that the faculty members skilled in basic internet knowledge showed a significant relationship to the course package and provided significant value in the mastery of content and its teaching pedagogy. It also provides that word processing enhanced pedagogy and multimedia correlates to course package delivery. This implication proves that incorporating technology into teaching practices provides the potential for positive learning outcomes. Obar (2014) claimed that using technology in the classroom for teaching and learning can positively impact students' learning in all areas: cognitive, affective, and psychomotor. The study recommends encouraging the use of technology in education.

Table 6. Relationship between technological knowledge and teaching proficiency

6.1 Basic Internet and:				
Course Packages	0.249*	Weak	0.011	Significant
Mastery of Content	0.325**	Weak	0.001	Highly Significant
Pedagogy	0.263**	Weak	0.007	Highly Significant
ICT Integration	0.218*	Weak	0.027	Significant
Assessment	0.202*	Weak	0.041	Significant
6.2 Word Processing and:				
Course Packages	0.004	Very Weak	0.971	Not Significant
Mastery of Content	0.161	Very Weak	0.105	Not Significant
Pedagogy	0.206*	Weak	0.037	Significant
ICT Integration	0.171	Very Weak	0.084	Not Significant
Assessment	0.066	Very Weak	0.509	Not Significant
6.3 Spreadsheets and:				
Course Packages	0.061	Very Weak	0.540	Not Significant
Mastery of Content	0.026	Very Weak	0.797	Not Significant
Pedagogy	0.132	Very Weak	0.183	Not Significant

ICT Integration	0.151	Very Weak	0.127	Not Significant
Assessment	0.135	Very Weak	0.173	Not Significant
6.4 Presentation and:				
Course Packages	0.092	Very Weak	0.357	Not Significant
Mastery of Content	0.053	Very Weak	0.593	Not Significant
Pedagogy	0.086	Very Weak	0.385	Not Significant
ICT Integration	0.175	Very Weak	0.076	Not Significant
Assessment	0.050	Very Weak	0.614	Not Significant
6.5 Multimedia and:				
Course Packages	0.208*	Weak	0.035	Significant
Mastery of Content	0.030	Very Weak	0.765	Not Significant
Pedagogy	0.106	Very Weak	0.286	Not Significant
ICT Integration	0.184	Very Weak	0.063	Not Significant
Assessment	0.008	Very Weak	0.933	Not Significant

Legend: Relationship Strength Scale: 1.00 (Perfect); 0.80-0.99 (Very Strong); 0.60-0.79 (Strong); 0.40-0.59 (Average); 0.20-0.39 (Weak); 0.01-0.19 (Very Weak); 0.00 (No Relationship)

Probability Value Scale: **p<0.01 (Highly Significant); *p<0.05 (Significant); p>0.05 (Not significant)

3.7 Relationship Between Criminology Faculty's Pedagogical Knowledge and Teaching Proficiency

Table 7 revealed a significant relationship between criminology faculty's pedagogical knowledge and their teaching proficiency, which showed a significant relationship in the motivation variables towards ICT integration. It demonstrates that the instruction variable correlates highly with mastery of content, pedagogy, and ICT integration. The assessment also proves a significant relationship to the mastery of content and is highly significant to pedagogy and ICT integration. This implies a strong correlation was found between the variables presented, which indicates areas that drive improvements in teaching strategies and student engagement.

This suggests that the criminology instructor's key success areas to effectively achieve the teaching process considering knowledge and proficiency are shown through the skills and knowledge of using digital technologies in education. (Jala, 2019). These findings imply the importance of pedagogical expertise in delivering quality instruction, adapting teaching practices based on assessment outcomes and utilizing technology effectively in the classroom. Positively implies that educational technology in the teaching and learning process validates teachers' proficiency and positive attitude toward technology (Panigrahi et al., 2018).

Table 7. Relationship between pedagogical knowledge and teaching proficiency

7.1 Objectives and:				
Course Packages	0.077	Very Weak	0.441	Not Significant
Mastery of Content	0.045	Very Weak	0.651	Not Significant
Pedagogy	0.090	Very Weak	0.367	Not Significant
ICT Integration	0.040	Very Weak	0.686	Not Significant
Assessment	0.088	Very Weak	0.375	Not Significant
7.2 Motivation and:				
Course Packages	0.034	Very Weak	0.736	Not Significant
Mastery of Content	0.168	Very Weak	0.090	Not Significant
Pedagogy	0.152	Very Weak	0.126	Not Significant
ICT Integration	0.203*	Weak	0.040	Significant
Assessment	0.174	Very Weak	0.080	Not Significant
7.3 Instruction and:				
Course Packages	0.084	Very Weak	0.399	Not Significant
Mastery of Content	0.295**	Weak	0.002	Highly Significant
Pedagogy	0.324**	Weak	0.001	Highly Significant
ICT Integration	0.355**	Weak	0.001	Highly Significant
Assessment	0.166	Very Weak	0.093	Not Significant
7.4 Assessment and:				
Course Packages	0.072	Very Weak	0.468	Not Significant
Mastery of Content	0.221*	Weak	0.023	Significant
Pedagogy	0.290**	Weak	0.003	Highly Significant
ICT Integration	0.267**	Weak	0.006	Highly Significant
Assessment	0.099	Very Weak	0.319	Not Significant

Legend: Relationship Strength Scale: 1.00 (Perfect); 0.80-0.99 (Very Strong); 0.60-0.79 (Strong); 0.40-0.59 (Average); 0.20-0.39 (Weak); 0.01-0.19 (Very Weak); 0.00 (No Relationship)

Probability Value Scale: **p<0.01 (Highly Significant); *p<0.05 (Significant); p>0.05 (Not significant)

4.0 Conclusion

The majority of the Criminology faculty are young adult women with master's degrees units, and they have been working as contractual employees for between one and five years. They possess a high level of teaching proficiency and average technological and pedagogical knowledge. This teaching proficiency is significantly valued in age and its course package, sex, mastery of the content, and assessment value. Furthermore, the level of technological knowledge and teaching proficiency on basic internet knowledge is highly correlated to variables of mastery of the content and pedagogy. Somehow, it also showed a significant relationship to the course package, ICT integration, and assessment. Also, the variables of word processing knowledge are significantly related to its pedagogy and multimedia to its course package mastery.

Pedagogical knowledge and teaching proficiency showed a strong relationship with motivation, while the variable of ICT integration toward instruction and assessment showed a highly significant relationship. Both the methodology and the topic mastery have a strong significant relationship between teaching and assessment, and this proved to have a significant impact on each variable. With the findings, the Criminology faculty should prioritize ongoing professional development and related training on technological strategy engagement to foster a dynamic and effective learning environment. This includes actively participating in ICT-integrated workshops, training programs, webinars, and pursuing advanced studies to refine their teaching skills and stay abreast of emerging pedagogical approaches. As gleaned, the Higher Education Institutions (HEIs) supporting this endeavor promote programs that regularly organize seminars and webinars to enhance pedagogical knowledge and equip faculty with the necessary technological skills to integrate technology effectively into classroom engagement.

5.0 Contributions of Authors

The authors contributed equally to each part of the study. The writers approved the final works. Reviews were done as a research team to ensure accuracy and consistency. The collaborative effort between the authors resulted in a comprehensive and well-rounded study that was ready for publication.

6.0 Funding

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7.0 Conflict of Interests

The authors declare that there are no conflicts of interest related to the publication of this paper.

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