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Challenges and Issues in Utilization of Emerging Technologies in Undergraduate Research Writing at Holy Cross College, Sta. Rosa, NE., INC.

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Abstract. This study examines the use of emerging technologies in undergraduate research at Holy Cross College, Sta. Rosa, N.E., Inc., using the Unified Theory of Acceptance and Use of Technology (UTAUT) as a framework. A mixed-method approach, combining a structured survey and open-ended questions, gathered data from 70 students across various programs. The results show that while emerging technologies enhance research efficiency and quality, barriers such as limited technical skills, insufficient infrastructure, and inadequate training impede widespread adoption. Although students report high-performance expectancy and ease of use, challenges like limited access to necessary software and resources persist. The study concludes that while integrating emerging technologies offers clear benefits, stronger institutional support is needed. The recommendation calls for Holy Cross College to invest in better technological infrastructure and provide comprehensive training to support the adoption and effective use of these tools in undergraduate research.

Keywords: *Emerging Technologies, Undergraduate Research, UTAUT Framework, Technology Adoption, Institutional Support*

1. Introduction

The utilization of emerging technologies in academic research has revolutionized the way students approach research writing (Lozano-Álvarez et al., 2023). These technologies enable students to access vast amounts of information, organize references efficiently, collaborate in real-time, and streamline data analysis, thereby enhancing the overall quality and efficiency of research output (Calvert et al., 2020). As higher education institutions adopt digital tools to support research endeavors, students are increasingly expected

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to incorporate them into their work (Mitha & Omarsaib, 2024). Pradhan and Karmbe (2020) found that students who use reference management software like Mendeley or EndNote produce better-organized research papers, while collaboration platforms such as Google Docs and Microsoft Teams enhance group work efficiency (Perkel, 2020). Artificial Intelligence tools like Grammarly improve writing quality by offering real-time feedback (Huang et al., 2020), and cloud computing platforms like Google Drive provide seamless access and storage for research projects (Arpaci, 2017). Digital repositories such as JSTOR offer students access to a wide range of scholarly sources (Yamson et al., 2020), and data analytics tools like SPSS help in processing and analyzing large datasets effectively (Roni & Djajadikerta, 2021).

However, despite these uses of emerging technologies, the successful integration of these technologies remains a challenge. Studies suggest that limited access to training, inadequate infrastructure, and lack of institutional support can hinder the use of digital tools in academic research (Gkrimpizi et al., 2023). Moreover, many students lack the technical skills necessary to navigate complex software, leading to frustration and underutilization (Limniou, 2021). Given the increasing demand for technological competency in academic research, it is crucial to understand how students navigate the process of integrating emerging technologies into their research.

Despite a growing body of research on the adoption of emerging technologies in academic writing, most studies focus on larger, well-funded institutions, leaving a gap in understanding the challenges faced by smaller institutions like Holy Cross College, Sta. Rosa, N.E., Inc. This research aims to address this gap by investigating how students experience the integration of emerging technologies into their research processes through the lens of the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. By examining the key UTAUT constructs, the study will explore the use of these tools, as well as the challenges they face. The study's findings will not only contribute to the academic discourse on technology adoption in undergraduate research writing but also offer practical recommendations for Holy Cross College, Sta. Rosa, N.E., Inc. and similar educational institutions to enhance support, including better access to training, resources, and infrastructure to improve students' research experiences and academic success.

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Research Questions

This study aims to identify the challenges and issues in the utilization of emerging technologies in undergraduate research writing at Holy Cross College, Sta. Rosa, N.E., Inc. Specifically, the study seeks to address the following research problems:

1. How the demographic profile of the respondents may be described in terms of: program/course, apps/software used?
2. How may the utilization of emerging technologies in undergraduate research writing be described in terms of: performance expectancy, effort expectancy and facilitating conditions?
3. What are the challenges and issues in the utilization of emerging technologies in undergraduate research writing?

2. Methodology

This study employed a mixed-method approach to investigate the utilization of emerging technologies in undergraduate research writing at Holy Cross College, Sta. Rosa, N.E. The research design was descriptive, merging both quantitative and qualitative methodologies to provide a comprehensive understanding of how students use these technologies and the challenges they face in the research writing process.

A total of 70 respondents for this study was selected through purposive sampling, targeting undergraduate students from various programs at Holy Cross College who have engaged in research writing. This sampling method ensured that participants had direct experience with both the research process and the use of digital tools (Ali et al., 2022). By focusing on students who are actively involved in research, the study aimed to gather relevant insights regarding the adoption, challenges, and overall effectiveness of these technologies in enhancing their research output.

Data collection involved two primary methods. First, a structured survey incorporating Likert-scale questions was utilized to assess students' utilization of emerging technologies in research writing. This survey specifically measured key constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT) model, including performance expectancy, effort expectancy, social

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influence, and facilitating conditions. Additionally, demographic information such as the participants' program of study and the specific applications or software they utilized were collected. Second, open-ended questions were included to capture qualitative feedback, allowing students to express the specific challenges they encountered when using the emerging technologies. These questions also solicited suggestions for improving the adoption of these technologies and the support systems available at Holy Cross College.

Data analysis was conducted in two phases. The quantitative data were analyzed using descriptive statistics, such as means, standard deviations, and frequency distributions, to provide an overview of how students perceived the usefulness, ease of use, and overall impact of emerging technologies on their research writing processes. This quantitative analysis offered a clear picture of students' experiences with the digital tools they employed. The qualitative data, on the other hand, were subjected to thematic analysis to identify recurring challenges and themes related to the students' experiences with technology integration in their research writing.

Ethical considerations were a fundamental aspect of this research. Participants were informed about the purpose of the study, the methods of data collection, and the voluntary nature of their participation. Informed consent was obtained prior to data collection, and participants were assured that their responses would remain confidential. Anonymity was maintained throughout the study, thereby protecting participants' identities and ensuring the ethical integrity of the research process.

3. Results and Discussion

3.1. Demographic Profile of the Respondents

Table 1 shows that most respondents (74.3%) are from the Bachelor of Science in Hospitality Management (BSHM) program, with 14.3% from Bachelor of Secondary Education (BSEd) and 11.4% from Bachelor of Elementary Education (BEEd). This reflects the dominance of BSHM, a practical, industry-oriented program, in the respondent pool. Callo and Yazon (2020) noted that students in such programs often have greater exposure to technology due to their applied learning focus, influencing the technological preferences highlighted below.

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Table 1. Program of the Respondents

Program	Frequency	Percentage
Bachelor of Elementary Education	8	11.4%
Bachelor of Secondary Education	10	14.3%
Bachelor of Science in Hospitality Management	52	74.3%
Total	70	100%

As shown in Table 2, the most used technologies are digital libraries (58.57%) and collaboration tools (52.85%), essential for research and teamwork. Wang et al. (2021) emphasized the value of collaboration tools in facilitating group work. AI-based writing tools (28.57%) demonstrate growing reliance on technology for productivity. On the other hand, cloud storage platforms (18.57%) and reference management software (11.42%) have moderate adoption, possibly due to limited training, as observed by Ali et al. (2021). Data analysis tools (10%) are the least used, reflecting their relevance primarily in quantitative tasks, as noted by Eakin and Gladstone (2020). These trends suggest that program orientation and academic tasks influence technology adoption among respondents.

Table 2. Emerging Technologies Used by the Respondents

Emerging Technologies	Frequency	Percentage
Reference management software (e.g., Mendeley, EndNote)	8	11.42%
Collaboration tools (e.g., Google Docs, Microsoft Teams)	37	52.85%
AI-based writing tools (e.g., Grammarly, Quill Bot, ChatGPT)	20	28.57%
Data analysis tools (e.g., SPSS, MS Excel, JAMOVI)	7	10%
Cloud storage platforms (e.g., Google Drive, Dropbox)	13	18.57%
Digital libraries/repositories (e.g., JSTOR, ResearchGate, Google Scholar)	41	58.57%
Others	1	1.43%

3.2. Utilization of Emerging Technologies

Table 3 highlights that performance expectancy received the highest mean (3.28), with respondents strongly agreeing that emerging technologies improve research quality, task efficiency, and deadline management. These findings align with Blichfeldt and Faullant (2021), which underscores the critical role of perceived performance benefits in technology adoption. However, the slightly lower score for time reduction (3.24) suggests that while helpful, these tools may

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not fully streamline research tasks, indicating opportunities for optimization in their application.

Table 3. Weighted Mean of Performance Expectancy

Statements	Mean	Verbal Description
1. Using emerging technologies enhances the quality of my research output.	3.37	Strongly Agree
2. Emerging technologies help me manage my research tasks more efficiently.	3.34	Strongly Agree
3. I am able to produce better-organized research papers using emerging technologies.	3.19	Agree
4. Emerging technologies help me meet research deadlines.	3.26	Strongly Agree
5. Using these tools reduces the time needed to complete my research tasks.	3.24	Agree
GWA	3.28	Strongly Agree

Effort expectancy achieved a mean score of 3.11 (Table 4), indicating that respondents generally find emerging technologies easy to learn and use. Confidence in navigating research tools is consistent with the findings of Chen and Aklikokou (2020), which emphasizes ease of use as a key determinant of user adoption. However, the relatively uniform scores (3.07–3.13) suggest that while students are comfortable with existing tools, additional training could further enhance usability, particularly for those unfamiliar with newer software

Table 4.Weighted Mean of Effort Expectancy

Statements	Mean	Verbal Description
1. Emerging technologies are easy to learn and use.	3.13	Agree
2. It is easy to understand how to use the tools required for my research.	3.13	Agree
3. The interface of most research software is straightforward to navigate.	3.09	Agree
4. I can quickly learn to use new digital tools for research.	3.07	Agree
5. I feel confident in my ability to use digital tools for research writing.	3.13	Agree
GWA	3.11	Agree

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Facilitating conditions received the lowest mean (2.87), highlighting challenges in infrastructure, training, and access to premium tools (Table 5). Scores for infrastructure (2.80) and digital library access (2.73) underscore barriers that may hinder students from fully utilizing available technologies. These results resonate with Francom's (2020) study, which emphasizes the importance of institutional resources in supporting technology integration. Addressing these gaps through enhanced infrastructure, subsidized tools, and targeted training sessions could significantly improve the research experience.

Table 5. Weighted Mean of Facilitating Conditions

Statements	Mean	Verbal Description
1. Holy Cross College provides access to the necessary software and applications.	3.04	Agree
2. Training sessions are offered to help students understand digital tools for research.	2.90	Agree
3. Free or subsidized access to premium research tools is available to students.	2.89	Agree
4. The infrastructure at the college supports the use of emerging technologies (e.g., reliable internet, updated computers).	2.80	Agree
5. I have access to digital libraries and repositories through the institution.	2.73	Agree
GWA	2.87	Agree

In summary, students recognize the value of emerging technologies in enhancing research quality and efficiency but face challenges in access and institutional support. Strengthening training programs, upgrading infrastructure, and expanding resource access are critical steps for maximizing the benefits of these tools in undergraduate research writing.

3.3 Challenges and Issues in Utilization of Emerging Technologies

Emerging technologies for undergraduate research writing face challenges such as technical limitations, limited access to tools, and compatibility issues. These barriers hinder the integration of technology into academic workflows, affecting productivity and quality. The high cost of premium software also affects students in resource-constrained environments (Rahardja, 2022). Singh and Dhiman (2023) stated that the credibility and reliability of information obtained through digital tools are also significant issues. Students often encounter

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unverified sources, misinformation, and outdated information, which can undermine research integrity. Critical evaluation skills are crucial to ensure the credibility of sources used in academic writing.

Students also face difficulties in integrating traditional research methods with new digital technologies. Berardinucci et al. (2020) argue that balancing both approaches is a struggle, with students finding it hard to incorporate digital tools into their existing workflows. Ethical and privacy concerns further complicate this issue, as using AI and digital platforms raises concerns about data security, plagiarism, and over-reliance on technology. Nasar and Kamal (2021) highlight the ethical dilemmas that arise from using AI tools, stressing the need for clear guidelines to navigate these challenges.

Finally, institutional and support issues play a significant role in the challenges students face. Ayoko et al. (2023) argue that the lack of institutional training, inadequate resources, and insufficient support from educational institutions leave students ill-equipped to navigate the complexities of emerging technologies in their research. Smith et al. (2023) suggest targeted interventions like improved digital infrastructure, institutional training programs, and better access to curated resources can enhance students' potential in emerging technologies.

4. Conclusions

The findings highlight that emerging technologies significantly enhance students' research processes, as evidenced by high ratings for performance expectancy. These tools contribute to better quality outputs and improved efficiency. However, gaps in facilitating conditions, such as limited access to resources and infrastructure, hinder full utilization. Challenges faced by students include technical difficulties (e.g., slow internet, compatibility issues), issues with the credibility of online information, and the learning curve for mastering new tools. Ethical concerns, such as reliance on AI tools and ensuring data privacy, further complicate the adoption of these technologies. Additionally, the absence of significant differences in technology utilization across profile groups suggests that challenges and benefits are perceived uniformly, regardless of program or demographic differences.

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