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TECHNICAL ASPECT AND USE OF ICT IN WRITING RESEARCH AMONG TERTIARY INSTITUTION STUDENTS

Michael G. Albino[1], Femia S. Albino[2], John Mark Asio[3], Erin E. Riego de Dios[4], and Marie Fe D. De Guzman[5]*

[1] Faculty of Computer Science, President Ramon Magsaysay State University, Philippines
[2] Faculty of English, President Ramon Magsaysay State University, Philippines
[3] Research Development Unit, Gordon College, Philippines
[4] Faculty of Social Science, Gordon College, Philippines
[5] Graduate School Department, President Ramon Magsaysay State University, Philippines

ABSTRACT

This study aimed to evaluate students' levels of competency technical aspects and use of ICT for research writing, as well as the underlying connection between these two variables. This investigation will serve as a basis for faculty to enhance their teaching process in a research writing course at the college level. The researchers employed cross-sectional analysis with 310 purposively chosen respondents. They answered a modified research instrument via Google Forms. The researchers then subjected the gathered data to descriptive and inferential statistics using IBM-SPSS 23. The study found that the students were primarily third-year level, coming from the College of Education, Arts, and Sciences, and were female, with a GPA between 86% and 89%, pursuing a Bachelor of Science in Accountancy. In addition, regarding the technical aspect of writing research, the study revealed that the students were "competent." As for the use of ICT in writing research, the students were "able to perform" some of the mentioned ICT tools. Inferential statistics also revealed variations in the technical aspects of writing research when grouped by year level and GPA. Regarding the use of ICT in research writing, the study observed differences in terms of year level, college, GPA, and course. A moderate association was found between technical aspects and the use of ICT in writing research, as confirmed by the linear regression. Based on the study's results, the researchers suggested some essential implications.

Keywords: Research writing; technical writing; ICT use; higher education institutions; college students; correlation study

***Corresponding author:**
Michael G. Albino
malbino@prmsu.edu.ph

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1. INTRODUCTION

When writing a research paper, researchers frequently encounter specific challenges that hinder their ability to accomplish the task. However, writing it can be the most daunting task throughout the research process. Conrad and Lee (2020) emphasized that researchers must pay close attention to the documentation of a manuscript to ensure concise and accurate reporting of results. Many journals, especially those indexed in prestigious indexing databases, have strict regulations for writing research papers. Manuscript rejection is a

common occurrence, and most journals publish only a fraction of the documents submitted (Kim et al., 2019). Prospective authors need to re-draft and resubmit rejected manuscripts for publication. Writing a research manuscript is a complex process, and publishing it in peer-reviewed journals can prove challenging if the methods are inappropriate and the results are unclear (Fernández et al., 2022). When accepted for publication, it will undergo a series of peer reviews, checking its contents and other technical aspects to ensure that it is a genuine, original, and novel research article. During a peer review, it is essential to inspect for flaws and deficiencies in the design and interpretation of the studies (Stephen, 2021). Thus, the reviewers focus on the manuscript's theoretical and methodological details, as well as its communication style. In addition, Makin and Orban de Xivry (2019) identify mistakes in scientific literature as originating from ineffective experimental designs, inappropriate analyses, and flawed reasoning. They have to deal with paper rejection; some may get significant revisions along the way and, later, still get rejected when the researchers need to follow the recommendations. This rejection leads to a detrimental effect on the writers. However, Argan et al. (2023) argue that those who received desk rejections and peer review rejections had negative emotional responses and resorted to avoidant, neutral, and approach strategies to cope with manuscript rejections. In addition, Nückles et al. (2020) noted that writing serves as a scaffold for self-regulated learning due to the cognitive offloading of text, which provides an external representation and memory aid, resulting in a genre-free principle in journal writing. Another dilemma that researchers must deal with writing manuscripts is the language. According to Ramírez-Castañeda (2020), scientists must write their papers in English to be successful in producing scientific papers, as 98% of publications (in Science) are in English. Therefore, one should be well-versed and acquainted with the most commonly used language in most journals.

In today's digital age, Information and Communication Technology (ICT) has revolutionized various aspects of our lives, including academic research. Williams and Beam (2019) noted that various digital technologies, applications, and web-based learning environments have been utilized to enhance academic writing. In the context of writing research, ICT offers many technical tools and resources that have transformed how tertiary institution students approach and conduct their research endeavors. Misra (2021) mentioned that researchers can select appropriate topics, conduct a thorough review, outline the main components of a paper, and present results with the help of ICT. These technological advancements have made the research process more efficient and streamlined, expanding the horizons of available information and communication channels. However, according to Rabahi (2019), most students in the paper used technology for cheating or plagiarism.

The technical aspects of writing research encompass a range of skills and competencies necessary for producing high-quality research outputs. Research by Hayati et al. (2021) demonstrated that the use of ICT and learning attitude contributed to the improvement of English academic writing. From conceptualizing research ideas to organizing arguments, formatting manuscripts, and employing appropriate writing styles, students must master various technical aspects to effectively communicate their research findings. However, according to previous research by Sim (2022), one of the key findings was that participants require more substantial support to enhance their ICT use as they have low e-literacy. Additionally, adhering to institutional guidelines regarding pagination, numbering, spacing, indention, and the inclusion of tables, figures, and headings is crucial to ensure the professionalism and integrity of the research paper.

However, the integration of ICT has genuinely transformed the landscape of writing research. Rabahi (2019) revealed that universities and institutions should achieve integrity if learners are aware of the positive aspects of ICT in academic research. Misdi et al. (2020) mentioned that students felt more motivated to complete their thesis. Instead of individual work, the researchers engaged in collaborative work. Using ICT tools in research writing offers numerous advantages and opportunities for tertiary institution students. However, Martinez-Daza et al. (2021) identified a gap in the need for more knowledge and the use of ICT, especially in tools intended for the disciplinary field and research. Digital libraries and online databases have made access to scholarly literature more convenient than ever, allowing students to explore many resources from their computers. This accessibility enables students to conduct comprehensive literature reviews, stay current with the latest research, and explore specialized fields of study.

Word processing software, like Microsoft Word or Google Docs, has become indispensable for writing research papers. As Krishnasamy et al. (2022) stated, ICT advancements have enabled humans to accomplish various tasks efficiently. These applications offer a range of features, including spell-checking, grammar-checking, and formatting options, which help students improve the accuracy and clarity of their writing. In a related article, Alobaid (2020) reported that multimedia educational tools developed using ICT are practical and strongly recommended for both learners and teachers. Collaboration features within these software platforms also facilitate seamless teamwork, allowing for efficient feedback and revision processes. Fuertes and Follosco (2021) implied that students should actively utilize ICT for diverse academic and research activities.

Moreover, the use of ICT extends to data collection and analysis, which are integral components of the research process. A recent study by Guillén-Gámez et al. (2023) confirmed the technological integration of respondents in using ICT for research work. Online survey platforms enable students to collect data from a larger sample size efficiently and effectively. In contrast, data analysis software automates complex calculations and statistical analyses. These tools enhance the accuracy and rigor of research findings, enabling students to draw meaningful conclusions and insights from their data. Martinez-Daza et al. (2021) demonstrated that students' attitudes toward incorporating technologies in the research seedbed are positive.

Furthermore, ICT plays a vital role in facilitating communication and collaboration among students, as well as between students and their supervisors or mentors. Samoylenko et al. (2022) noted that universities utilize ICT in managing educational processes, establishing various forms of communication and interaction, and conducting assessment and evaluation processes. Email, instant messaging, and video conferencing enable efficient and effective communication, ensuring students can seek guidance, clarify doubts, and receive timely feedback throughout the research process.

Based on the different perspectives on the technical aspects of writing a research manuscript and the use of ICT in research, there is a need for more literature or evidence that explicitly focuses on these two variables and measures their association. More specifically, there is a need for additional local literature to support the objectives of the current study. With this in mind, the investigators created this study that primarily focused on the relationship between the two variables. Thus, the primary aim of this research is to examine the technical aspects of student research writing and their use of ICT tools in research and to identify the underlying connection between them. The study focused on examining the technical aspects and use of ICT in writing research among tertiary institution students in Olongapo City. The proponents chose these participants because they were enrolled in a research writing course. Their experiences are highly valuable in this investigation, offering a glimpse into their capabilities and research writing skills. Recognizing their unique challenges will enable educators and research instructors to devise effective mechanisms to address them.

Furthermore, undertaking this research will address two key purposes: first, to fill the existing gap in the literature regarding the relationship between the two variables, and second, to provide additional local literature and contribute to the growing body of knowledge on the chosen topic. The results of this study will significantly benefit the faculty, students, and the institution in several ways, including improving and enhancing the teaching capability and use of ICT in research writing for both faculty and students.

The study also intended to address the following research objectives:

1. Describe the general sample based on their demographic characteristics;
2. Determine the level of technical aspect of writing in research among the participants;
3. Determine the capability of the respondents in the use of ICT in research writing;
4. Analyze any underlying variance in the technical aspect of writing and use of ICT in research writing among the participants and
5. Analyze the relationship between the technical aspect of writing research and the use of ICT.

2. METHODOLOGY

2.1 Research design

This study employed a descriptive-correlation design. The quantitative research approach involves describing a particular phenomenon and attempting to associate certain variables with one another. To accomplish this, the researchers employed an online survey method as the primary data-gathering tool. Since the main aim of this paper is to determine the technical aspects and use of ICT in writing research among students, as well as the association between the two variables, the said design is suitable.

2.2 Participants of the study

The respondents for this study were students from a local tertiary institution located in Olongapo City, Philippines. The researchers chose this population because most tertiary students conduct research as part of their course requirements to complete their undergraduate or graduate program. The study gathered data from 310 students who voluntarily completed the online survey form, with the data collection period spanning from September 2022 to May 2023. The study determined the sample size based on Kline's (2016) sample size guidelines, which indicate that a sample of more than 200 is considered significant. Memon et al. (2020) also explained this context in their paper regarding sample size. The sampling method was purposive, allowing the researchers to maximize the data needed for the study. The following were the criteria for inclusion: a) full-time student of a recognized higher education institution in Olongapo City or neighboring provinces, b) currently enrolled in the academic year, c) has already taken or is currently taking up a research subject in the institution, and d) willing to participate in the online survey. The researchers chose the students in Olongapo

City primarily because of the convenience and, at the same time, the diversity of students that study there. Additionally, one of the researchers in the study is a research instructor at the institution, who observed the varied perspectives of students on using technology in their research work. The following are the criteria for exclusion: a) working individual or part-time student, b) not enrolled within the academic year, c) has not taken up any research subject in the school, and d) unwilling to participate in the online survey.

2.3 Instrumentation

The study used a modified instrument from a previous study by Bucar (2022), which assessed the students' research writing concepts. The instrument has the following sections: a) the demographic characteristics of the respondents, b) the technical aspects of writing research, and c) the use of ICT in writing research. Specifically, example items for the technical aspects of writing research include "Write or create an appropriate working research title" and "Format and design a research paper based on an institutional format (e.g., pagination, numbering, spacing, indention, table, and figure, heading)." They can be answered using a four-point Likert scale, ranging from 1 (Not Competent) to 4 (Very Competent). As for the use of ICT, item examples include "Use office applications (MS Word, MS Excel, Powerpoint, etc.) to prepare the study's manuscript" and "Use software for qualitative (e.g., NVIVO, MAXQDA) and quantitative research (e.g., SPSS, STATA, Minitab) data or statistical analysis of the study." The participants can respond with another four-point Likert scale, ranging from 1 (Not able to perform) to 4 (Very able to perform). Since modifications were made to the research instrument, the proponents subjected it to validity and reliability tests. The researchers subjected the modified instrument to content validation by a panel of experts, which involved two seasoned researcher, an ICT professor, and two research instructors. Based on the sound and objective critiquing of the panel of experts, the instrument had some minor revisions. After the revisions, the instrument underwent pilot and reliability testing first. This process ensures the instrument's reliability. The instrument employed a Cronbach's Alpha reliability test, which measures the internal consistency of scales with multiple items. The overall Cronbach Alpha coefficient result was above 0.90, which falls under the interpretation of being highly reliable.

2.4 Data analysis

For the data to be analyzed, the study employed the following statistical treatment, assisted by the Statistical Package for the Social Sciences (SPSS) version 20. The data gathered underwent statistical treatment, including frequency, percentage, and mean, for descriptive analysis. For the inferential statistics, the data underwent analysis using t-tests, Analysis of Variance (ANOVA), Pearson's r Moment of Correlation, and linear regression analysis. In particular, to align with the study's objectives, the proponents used a t-test to determine if there exists significant variance between two independent groupings. It is a statistical treatment used to analyze if there is a significant difference between two groups (e.g., year level in this study). It also helps assess whether the observed difference is likely due to chance or a real effect. As for the Analysis of Variance, it is another test for difference, but this time, for three or more groups. It is essentially an extension of the t-test, but it compares three or more groups (such as college, gender, GPA, and course in this study). In terms of relationship, the Pearson-r moment of correlation was employed. This statistical tool measures the strength and direction of a linear relationship between two variables. To determine a predictor, a linear regression analysis was used. This statistical treatment employs a model of a relationship between a dependent variable and one or more independent variables by fitting a linear equation to the observed data. The study employed a four-point Likert scale to measure the students' responses.

3. RESULTS

The study aimed to analyze students' competency in the technical aspects of writing research and their performance using ICT in writing research. At the same time, evaluating any variations and relationships among the variables involved in the study. The following tables summarize the study's results.

Table 1: Demographic characteristics

Demographic characteristics	Frequency	Percentage
Year level		
Third year	221	71.3
Fourth year	89	28.7
College		
CEAS	194	62.6
CBA	71	22.9
CHTM	45	14.5

Table 1: Demographic characteristics (continued)

Demographic characteristics	Frequency	Percentage
Gender		
Male	92	29.7
Female	210	67.7
Others	8	2.6
GPA from the previous semester		
81–85%	39	12.6
86–90%	150	48.4
91–95%	114	36.7
96% above	7	2.3
Course		
BCAEd	12	3.9
BEED. BECEd	40	12.9
BPEd	29	9.4
BSA	71	22.8
BSEd-English	35	11.3
BSEd-Filipino	36	11.6
BSEd-Mathematics	16	5.2
BSEd-Science	14	4.5
BSEd-Social Studies	12	3.9
BSTM	45	14.5
Total	**310**	**100**

Table 1 presents the frequency and percentage distribution of the demographic characteristics of the study's respondents. In terms of year level, the majority of students came from the third-year level, accounting for more than 70% of the total sample. In the case of college, more students came from the CEAS, with more than 60% of the total sample. Regarding gender, the study had a higher proportion of female students compared to other genders, accounting for more than 60% of the total sample. Regarding the GPA from the previous semester, almost 50% of the students have a GPA between 86% and 90%. As for the course, more students came from the BSA course, accounting for more than 20% of the total sample. The table generally represents a typical collegiate scenario in which the study was conducted.

Table 2: Technical aspect of writing research among respondents

Statement	Mean	Interpretation
1) Conceptualize or propose research related to everyday life.	2.76	Competent
2) Write or create an appropriate working research title.	2.72	Competent
3) Format and design a research paper based on an institutional format (e.g., pagination, numbering, spacing, indention, table and figure, heading)	2.84	Competent
4) Observe suitable writing styles, grammar, and word selection	2.80	Competent
5) Organize comprehensible arguments into a paragraph with scholarly citations	2.80	Competent
6) Apply correct paraphrasing techniques for borrowed ideas and concepts	2.90	Competent
7) Apply communication skills in the conduct of research, data gathering, interviews, etc.	2.92	Competent
Overall mean	**2.82**	**Competent**

Legend: 1.00–1.74 = not competent; 1.75–2.49 = moderately competent; 2.50–3.24 = competent; 3.25–4.00 = very competent

Table 2 presents the results of the mean computation for the technical aspects of writing research among the students. In general, it can be inferred that most students assigned a high score to this part of the study. In particular, applying communication skills to conduct research, gather data, and interview garnered the highest mean score of 2.92. In the Likert scale, it corresponds to the interpretation of "competent." On the other hand, writing an appropriate working title generated the lowest mean score of 2.72, which also corresponds to a similar interpretation of "competent" on the scale. Meanwhile, the study got an overall mean of 2.82 for the technical aspect of writing research among the students. This result also represents the same interpretation of "competent" in the Likert scale. This result also indicates a reasonable level of confidence and proficiency in various research writing skills.

Table 3: Use of ICT in writing research

Statement	Mean	Interpretation
1) Use office applications (MS Word, MS Excel, PowerPoint, etc.) to prepare the study's manuscript.	3.05	Able to perform
2) Use software for qualitative (e.g., NVIVO, MAXQDA) and quantitative research (e.g., SPSS, STATA, Minitab) data or statistical analysis of the study.	2.45	Able to perform moderately
3) For literature sources, perform online research using search engines (e.g., Google Scholar, ERIC, SSRN, etc.) and reputable electronic databases (e.g., Scopus, Web of Science, EBSCO, ProQuest, Emerald Insight, Psych Info).	2.88	Able to perform
4) Perform online grammar and plagiarism tests (e.g., Grammarly, Quillbot, Plagscan, Turnitin, iThenticate, etc.)	3.07	Able to perform
5) Perform online correspondence (e.g., email) with journal submission.	3.03	Able to perform
Overall mean	**2.89**	**Able to perform**

Legend: 1.00–1.74 = not able to perform; 1.75–2.49 = able to perform moderately; 2.50–3.24 = able to perform; 3.25–4.00 = very able to perform

The study also presents the result of the use of ICT in writing research in Table 3. Based on the presentation, most of the statements also rendered high scores except for one. In particular, performing online grammar and plagiarism tests yielded the highest mean score of 3.07. This result has an equivalent interpretation of "able to perform" in the Likert scale. However, using software for qualitative and quantitative research yielded the lowest mean score of 2.45, corresponding to a Likert interpretation of "able to perform moderately." The study obtained a mean score of 2.89 for the use of ICT in writing research. It also similarly interprets "able to perform" in the scale. This result also implies a reasonable level of confidence and proficiency in utilizing ICT tools and platforms for research purposes.

Table 4: Difference in technical aspect and use of ICT in writing research when grouped according to year level

Variable	Year level	N	Mean	SD	*t*-test	*p*-value
Technical aspect	3rd Year	221	2.77	0.590	-2.200*	.029
	4th Year	89	2.94	0.586		
Use of ICT	3rd Year	221	2.81	0.636	-3.918*	.000
	4th Year	89	3.11	0.563		

Note: df = 308; *p< .05

Table 4 displays the results of the independent t-test for the technical aspects and use of ICT in writing research, grouped according to the respondents' year level. Based on the study's result, one can determine that the computation yielded significant differences. In terms of the technical aspect of writing research, the study yielded a $t(308) = -2.200$, $p = .029$, indicating that 4th-year-level students have a higher mean score (M = 2.94; SD = 0.586) than 3rd-year-level students (M = 2.77; SD = 0.590). On the other hand, for the use of ICT in writing research, there was also a significant difference, $t(308) = -3.918$, $p = .000$, which means that the 4th year level has a higher mean score (M = 3.11; SD = 0.563) than the 3rd year level (M=2.81; SD = 0.636). Both variables, the technical aspect and the use of ICT in writing research, revealed substantial evidence of variations in students' responses. Therefore, the null hypothesis of the study is currently rejected.

Table 5: Difference in technical aspect and use of ICT in writing research when grouped according to college

Variable		SS	df	MS	*F*-test	*p*-value
Technical aspect	Between groups	0.975	2	0.488	1.392	.250
	Within groups	107.552	307	0.350		
	Total	**108.527**	**309**			
Use of ICT	Between groups	4.035	2	2.018	5.224*	.006
	Within groups	118.574	307	0.386		
	Total	**122.610**	**309**			

Note: *p*-value < .05

Table 5 illustrates the result of the Analysis of Variance (ANOVA) for the technical aspect and use of ICT in writing research. Based on the study's results, an exciting finding emerged from the computation. Regarding the use of ICT in writing research, a significant difference was found, $F(2, 307) = 5.224$, $p = .006$. The probability value obtained by the calculation was lower than the alpha significance level of 0.05. This result indicates a significant difference in the use of ICT when grouped by the student's college. However, there were no significant variations in the technical aspects of writing research, as seen in the table, since $F(2, 307) = 1.392$,

p = .250. The p-value for the technical aspect of writing research was lower than the alpha significance level of .05. This result only suggests no significant variation in the students' responses when grouped according to college.

Table 6: Difference in technical aspect and use of ICT in writing research when grouped according to gender

Variable		SS	df	MS	*F*-test	*p*-value
Technical aspect	Between groups	0.634	2	0.317	0.902	.407
	Within groups	107.893	307	0.351		
	Total	**108.527**	**309**			
Use of ICT	Between groups	0.335	2	0.167	0.420	.657
	Within groups	122.275	307	0.398		
	Total	**122.610**	**309**			

Note: p > .05

Table 6 depicts the result of the Analysis of Variance (ANOVA) computation for the technical aspect and use of ICT in writing research when grouped according to gender. Based on the table, more evidence is needed to prove significant differences in the technical aspect and use of ICT in writing research. The study obtained the following results for technical aspect, $F(2, 307) = 0.902$, $p = .407$ and for the use of ICT in writing research, $F(2, 307) = 0.420$, $p = .657$. Both of the generated p-values were greater than the alpha significance level of 0.05. The computational result indicates that no significant relationship was found between the technical aspect and the use of ICT in writing research when grouped according to the respondents' gender. This result also implies that, regardless of the respondents' gender orientation, the technical aspects and the use of ICT in writing research make no substantial difference.

Table 7: Difference in technical aspect and use of ICT in Writing research when grouped according to GPA from previous semester

Variable		SS	df	MS	*F*-test	*p*-value
Technical aspect	Between groups	6.325	3	2.108	6.313*	.000
	Within groups	102.202	306	0.334		
	Total	**108.527**	**309**			
Use of ICT	Between groups	7.180	3	2.393	6.345*	.000
	Within groups	115.429	306	0.377		
	Total	**122.610**	**309**			

Note: *p < .05

Table 7 presents the results of the Analysis of Variance (ANOVA) for the technical aspects and use of ICT in writing research. As shown in the table, an interesting result emerged. The Analysis of Variance for the technical aspect of writing research gained $F(3, 306) = 6.313$, $p = .000$, and for the use of ICT in writing research obtained $F(3, 306) = 6.345$, $p = .000$. Both of the p-values were lower than the alpha significance level of .05 means that there were significant differences in both variables when grouped according to the respondents' GPA from the previous semester. It further implies that the respondents' academic performance has a significant impact on the technical aspects and use of ICT in research writing.

Table 8: Difference in technical aspect and use of ICT in writing research when grouped according to course

Variable		SS	df	MS	*F*-test	*p*-value
Technical aspect	Between groups	3.436	9	0.382	1.090	.370
	Within groups	105.092	300	0.350		
	Total	**108.527**	**309**			
Use of ICT	Between Groups	10.407	9	1.156	3.092*	.001
	Within Groups	112.202	300	0.374		
	Total	**128.694**	**309**			

Note: *p < .05

Table 8 presents the analysis of variance results from the technical aspect and the use of ICT in writing research computations, grouped by respondents' course. According to the presentation in Table 8, a significant difference was found in the use of ICT in writing research. The study obtained $F(9, 300) = 3.092$, $p = .001$, wherein the alpha significance level is lower than .05. This result indicates substantial evidence of variation in the responses among the study respondents. On the other hand, the study obtained $F(9, 300) = 1.090$, $p = .370$, for the technical aspect of writing research. The probability value was more significant than the alpha significance level set at .05, which means that the result signifies no variation in the respondents' answers when grouped according to their course.

Table 9: Correlation matrix between technical aspect and use of ICT in writing research

Variables		Use of ICT in writing research
Technical aspect of writing research	Pearson correlation	.610*
	Sig. (2-tailed)	.000
	N	310

Note: *p < .05

To determine the association between the technical aspect and the use of ICT in writing research, the study performed a Pearson-r Moment of Correlation analysis. Table 9 presents the study's results. As one can decipher, there was substantial proof that an association exists between the study's two variables. The computation yielded a result of r = 0.610, with an associated probability value of 0.000. This result implies a moderate positive relationship between the technical aspect and the use of ICT in writing research.

Table 10: Linear regression for technical aspect of writing research as predictor for use of ICT

Model	Unstandardized coefficients		Standardized coefficients	*t*	Sig.
	B	Std. error	Beta		
(Constant)	1.067	.138		7.715	.000
Technical aspect	.648	.048	.610	13.496*	.000

Note: $F(1, 308) = 182.134$, sig = .000; $R^2 = .372$

Table 10 presents the linear regression model for the technical aspect of writing research as a predictor of using ICT in writing research. The results show substantial evidence of such a relationship, as one can discern. The study obtained a B coefficient of 0.648 with an associated probability value less than the alpha significance level of .05. This finding also implies that the technical aspect of writing research significantly predicts the use of ICT in writing research.

4. DISCUSSION

The technical aspect of writing research is a crucial foundation for crafting an influential article. In the study, the respondents demonstrated sufficient competence. This result indicates that they possess a basic understanding of writing a manuscript. Deb et al. (2018) wrote that writing communicates thoughts, ideas, and new knowledge. Based on this premise, the proponents determined that it aligns well with the current study results. From another perspective, writing action research among professionals also has benefits. In Ching's study (2021), the author mentioned that academic writing motivation is significantly associated with the competence of writing action research. For students, technical writing poses a significant challenge; Helaluddin et al. (2020) noted that students struggle with academic writing, encompassing both technical aspects and difficulties in developing writing ideas. However, the author also found that students were competent enough, thus challenging the findings of Helaluddin et al. (2020). For faculty, teaching students to write research can be a challenging task task; however, a study by Selvarasu et al. (2021) suggests that utilizing various online writing tools can effectively improve students' skills. This complements the current results, wherein students were able to utilize some ICT tools in aid of writing their research works. Writing tools have been available since the 1970s when computer accessibility increased (Mahlow, 2023). In foreign countries, writing academic papers can be pivotal to one's career. Thus, students should develop this critical skill, which will prove helpful in their future careers. Iqbal and Saeed (2021) revealed that grammatical errors made by graduate students were a significant hurdle for them, as these mistakes lower the quality of their academic papers. However, Vacalares et al. (2023) contradicted the current result, in which the students were found to be competent enough in terms of grammar and composition in their research writing.

Fernández Batanero et al. (2021) also found that most respondents were able to perform specific ICT processes related to writing research. The use of Information and Communication Technology (ICT) in writing research has become increasingly prevalent among tertiary institution students. ICT offers numerous technical aspects and benefits that enhance the research process for students. Conrad and Lee (2020) discussed the importance of focusing on specific details during manuscript preparation, such as the introduction, study methodology, and a clear and precise results and discussion section. Based on these claims, the authors complement the study's current findings. To accomplish this task, the practical use of ICT tools is necessary. Mahlow (2023) also emphasized that to design intelligent writing assistants; one should examine the purpose and implications learned from previous projects to define the importance of the dimensions. Once again, this supports the results of the current paper.

One of the primary technical aspects of ICT in writing research is the availability of digital libraries and online databases. Sinha and Subaveerapandiyan (2022) previously explored the research publication landscape regarding manuscript libraries. They found that the United States exceeds in this particular area. These resources offer students access to a wide range of scholarly articles, books, journals, and research papers. Unlike traditional libraries, digital libraries provide quick and convenient access to information, enabling students to search for relevant literature from the comfort of their own homes or campus. This accessibility significantly expands the scope of resources available to students, enabling them to conduct more comprehensive and in-depth research.

Furthermore, ICT tools such as word processing software (e.g., Microsoft Word, Google Docs) provide students with various features that facilitate the writing process. These tools provide spell-checking, grammar-checking, and formatting options, enabling students to enhance the quality and accuracy of their research papers. Rajan and Esmail (2021) revealed that students were able to perform office applications such as Microsoft Word and Excel. However, Ramírez-Castañeda (2020) somewhat refuted the result, claiming that writing a manuscript can be costly and expensive for countries with a low proficiency in English. However, Misra (2021) claimed that researchers can perform the technical writing process in research with the help of ICT. Such tools enhance the efficiency and effectiveness of the writing process, enabling students to produce well-structured and polished research papers, unlike the revelation of Rabahi (2019), wherein students use technology for cheating and plagiarism. ICT also plays a crucial role in data collection and analysis for research purposes. Research involves gathering and analyzing data, and ICT tools provide various methods. Online surveys and questionnaires can be created using platforms like Google Forms or SurveyMonkey, allowing students to collect data from a large sample size efficiently.

Data analysis software, such as SPSS (Statistical Package for the Social Sciences) or Excel, can be employed to analyze and interpret quantitative data. Krishnasamy et al. (2022) identified these tools in their study. These ICT tools mainly support academics in their research. These tools automate complex calculations and statistical analyses, simplifying the data analysis process for students.

The study also found significant variations in the respondents' technical aspects and use of ICT in writing research. Rulfi and Spada (2023) found that research papers made with the help of ICT tools demonstrated higher quality and coherence than traditional papers. Another study also Nayak and Narayan (2019) highlighted the significant differences in cost-effectiveness and retrieval period when using online tools for data gathering. There was also a direct association between the technical aspects of writing research and the use of ICT for writing a study. Simamora et al. (2020) found that ICT is significantly associated with writing achievement. The linear regression also confirmed the relationship between the two variables of the study. This finding supports the Hayati et al. (2021), which found that ICT has a significant influence on academic writing.

From the aforementioned results, the study provides substantial and new knowledge from which practical implications can be derived. At the same time, another research gap was addressed, as this study was conducted locally. The high GPA of the respondents suggests a strong academic foundation that can positively influence their research writing capacities. Such competency in technical writing aspect indicates potential for producing quality research outputs. The institution can develop customized training modules and targeted workshops or courses based on the needs and demands of students in technical writing and ICT skills. The study provided a positive indicator of students' proficiency in using ICT for research writing, demonstrating the effectiveness of leveraging technology in their academic work. Their ability to perform and use ICT in research writing signifies readiness to engage with digital tools for enhancing their research work and productivity. Integrating technical writing and ICT skills into the core curriculum of some relevant courses can ensure that students receive consistent and structured instructions throughout their academic journey. The differences observed in the study's technical aspects of writing research imply the need for tailored support and training programs to address specific gaps. The provision of faculty development offers opportunities for faculty members to enhance their technical writing and ICT competencies, which are relevant to their research. Lastly, the significant association determined by the study can serve as a guide for curriculum enhancement and development, as well as training initiatives aimed at fostering a holistic approach to research skill development among students. The institution can also invest in technological infrastructure and support the seamless integration of ICT tools in students' research projects.

Like other research papers, this particular paper also had certain limitations. First of which is the locale of the study. The study focused on only one tertiary education institution. Therefore, multiple institutions from neighboring provinces could be a potential avenue for future research. The current study employed a non-probability sampling method, which is non-preference by most journals. Future research can utilize probability sampling instead to minimize potential bias in data collection. This may also lead to more credible data and enhance the study's integrity. Future research can use moderation, mediation analysis, or Structural Equation Modeling (SEM). Alternatively, a mixed-methods approach to research could be employed to strengthen the perspective and context of the main idea in the current study.

5. CONCLUSION

The study yielded several relevant findings that are beneficial to individuals and groups. Based on the main objective of this study, the researchers found in the investigation that the respondents consisted of third-year CEAS students, predominantly female, with a GPA range of 86–89%, and pursuing a Bachelor of Science in Accountancy (BSA) degree. At the same time, in terms of technical writing abilities, the respondents demonstrated competence, while their proficiency in utilizing Information and Communication Technology (ICT) for research purposes was generally satisfactory. The study also highlighted some notable differences in the technical aspects of research writing, particularly the respondents' year level and GPA from the previous semester. Similarly, significant variations were noted in the use of ICT for research writing across different parameters, including year level, college, GPA from the previous semester, and course of study.

Furthermore, the research identified a significant correlation between the technical aspect of research writing and the utilization of ICT tools in the research process. This relationship was further validated through linear regression analysis, which affirmed the association between the two variables in the context of the study.

The study sheds light on the proficiency of students in technical writing and the use of ICT for research purposes. This investigation can help educators and institutions create teaching methodologies and resources tailored to the needs of students, enhancing their skills. It also pinpointed specific areas where students may require additional support or training. This information can guide the development of targeted interventions to address disparities. At the same time, it emphasized the relevance of equipping students with strong technical writing skills and ICT competencies for a successful research endeavor. Moreover, the results contributed to the curriculum development by highlighting the significance of integrating technical writing and ICT proficiency into the academic programs. Finally, future research can explore other potential variables that influence technical writing skills and ICT competencies of students with other types of populations or samples.

6. RECOMMENDATIONS

Based on the following results, the researchers presented the following recommendations:

1) For students, enhancing their research writing by committing to completing a manuscript or paper to appreciate its process is strongly encouraged. To accomplish this, provide a clear deadline, which can help students to appreciate the iterative process of research writing. A peer review session where students and their adviser exchange feedback on their manuscripts promotes constructive criticism and improvement.

2) Students should attend research writing seminars and training sessions within the institution or outside to stay up-to-date with the latest updates and techniques used in writing research manuscripts. Encouraging students to actively participate in research writing seminars and workshops both within and outside the institution will help them stay updated on the latest trends and techniques in research writing. They can also benefit from online resources, academic journals, and writing guides to enhance their writing skills and familiarity with different writing styles and formats.

3) The faculty should also be equipped with up-to-date skills and knowledge of writing manuscripts and expand their horizons in publishing research papers, thereby gaining experience and technical expertise. Provide faculty members with opportunities to attend writing workshops, seminars, and conferences to enhance their writing skills and stay current with best practices in manuscript preparation. Another approach is to establish a peer mentoring program where experienced faculty members can guide and support colleagues in manuscript writing, sharing insights and best practices.

4) The institution should also promote research capacity building for both faculty and students, enabling them to thrive in the scientific world and apply these skills in their future professions. The institution can allocate resources for research capacity-building initiatives that support faculty and students in developing their research skills. At the same time, the institution can offer grants and scholarships to incentivize faculty to engage in research activities and publish their findings.

5) The Research Center or Office should spearhead the necessary research writing knowledge through various seminars, webinars, or training sessions that focus on different ICT tools and processes available in the market, enabling both faculty and students to become acquainted with these essential tools. Seminars, webinars, and training sessions focused on ICT tools and processes relevant to research writing should be organized. Collaborate with industry experts and technology providers to offer hands-on training sessions on using these tools effectively for research purposes. Additionally, online resources and learning modules on research writing and ICT tools that are accessible to both faculty and students should be developed. Creating a repository of resources that cover a wide range of topics related to research writing and publication is also suggested.

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