

Graduate Students' Knowledge and Process Skills in Learning Research

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Abstract. Research competence is an essential aspect of graduate education, facilitating students' engagement in scholarly inquiry, contributing to knowledge creation, and effectively resolving real-world issues. Nonetheless, numerous graduate students encounter challenges in comprehending and applying research concepts and processes in their own work. This study investigated the research knowledge and process skills of graduate students at Northeastern College. Specifically, it evaluated the level of research knowledge concerning research concepts, research design, data collection methods, and data analysis, as well as research process skills in terms of problem identification, literature review, data gathering, data analysis and interpretation, and report writing. A quantitative descriptive-correlational design was employed, using a structured questionnaire administered to graduate students enrolled in research-related courses. Data analysis was conducted using the mean, standard deviation, Pearson's product-moment correlation coefficient, t-test, and analysis of variance (ANOVA). The findings indicate that graduate students exhibit a high level of research knowledge, while their research process skills are evident. A significant moderate positive correlation was identified between research knowledge and research process skills, suggesting that enhanced knowledge improves research performance. Significant differences were observed when grouped according to the academic program, whereas no significant differences were found concerning age, sex, and year level. Furthermore, difficulties in learning research were notably apparent, particularly in terms of statistical analysis, research design, and data interpretation. Based on these findings, an enhancement program is proposed to bolster research competence through targeted interventions, such as workshops, mentoring, and skills-based training.

Introduction

Research is important for learning more in areas such as education, science, and social studies. This helps both schools and society grow (Ye et al., 2024). In graduate school, learning how to conduct research well is a key goal. This means that students need to know both the theory and practical steps of research to grow in their careers (Guo et al., 2021). New learning tools can help students think better and learn more effectively, thereby helping them develop important academic skills (Anselmo, 2024). However, many graduate students still find it difficult to understand basic research ideas, choose the right research methods, and analyze data correctly (Ye et al., 2024). These problems can hinder their research work and slow down their studies, highlighting the need for better teaching methods and support in graduate programs (Daniel, 2022). Building strong research skills is considered a key outcome of higher education. It helps students finish their degrees on time and become innovative and knowledgeable (Han et al., 2022; Priyadarshini et al., 2022).

In the Philippine context, graduate programs commonly require students to complete a thesis or research project as a core academic requirement (Lobo 2023). Despite this expectation, many graduate students experience substantial challenges, including limited prior research exposure, difficulties in statistical analysis, and a lack of confidence in conducting

independent research (Lobo, 2023). Local studies have identified persistent gaps in both research knowledge and the practical application of research processes, which hinder students' academic progress and successful thesis completion (Lobo 2023). In response, higher education institutions in the Philippines have implemented various initiatives aimed at strengthening research instruction, such as improving thesis supervision and integrating innovative teaching approaches (Lorenzo, 2021). These efforts are essential for addressing systemic issues, including resource limitations and infrastructural constraints, while enhancing students' research competence and academic preparedness in the field.

At Northeastern College, graduate students are required to enroll in research-related courses and complete a thesis as part of their degree requirement. Despite these structured academic provisions, observations and informal feedback suggest that some students have difficulty mastering essential research skills. Moreover, noticeable variations exist in students' research knowledge and their ability to execute research processes effectively. These concerns highlight the need for a comprehensive assessment of both the cognitive (knowledge) and procedural (process skills) aspects of research learning. Such assessments are crucial for informing instructional improvements and strengthening institutional support mechanisms to enhance student outcomes.

Although there has been extensive research on teaching research, gaps remain. Many studies have examined research knowledge and skills separately. Few studies have examined both together, especially for graduate students who face more complex research tasks. We also do not have sufficient evidence on how research knowledge and skills are related or on the specific problems graduate students face when learning research. Many studies do not use their findings to create programs that help students based on real data. This study examined graduate students' research knowledge and skills. It determines how these are related and what challenges students face. The study's results will help create a program to improve graduate students' research skills. This will help advance research education and support graduate students' success.

Research Question

This study aims to answer the following questions.

1. What is the level of graduate students' research knowledge in terms of research concepts, research design, data collection methods, and data analysis?
2. What is the level of graduate students' research process skills in terms of problem identification, literature review, data gathering, data analysis and interpretation, and report writing?
3. Is there a significant relationship between graduate students' research knowledge and their research-process skills?
4. Are there significant differences in graduate students' research knowledge when grouped according to profile variables such as age, sex, academic program, and year level?
5. Are there significant differences in graduate students' research process skills when grouped according to profile variables such as age, sex, academic program, and year level?
6. What difficulties do graduate students encounter in learning research?
7. What enhancement program can be proposed based on the findings of the study?

Methodology

Research Design

This study employed a quantitative descriptive-correlational research design to examine the digital and AI literacy of public school teachers enrolled in graduate school. The descriptive component was used to determine the respondents' levels of digital and AI literacy across the identified dimensions, while the correlational approach was used to analyze the relationship between these two variables. In addition, the design enabled the researcher to determine whether significant differences exist in literacy levels when respondents are grouped according to their profile variables, such as age, sex, teaching experience, grade level taught, number of training sessions attended, and frequency of AI tool usage. This design was deemed appropriate because the study focused on describing existing conditions and examining the relationships among variables without manipulating any factors.

Research Locale

The study was conducted at Northeastern College, where graduate programs require students to complete research courses and a thesis as part of their academic requirements. The institution provides an appropriate setting for the study, as it reflects a typical higher education environment in which research competence is emphasized. The locale offers access to graduate students with varying academic backgrounds, allowing for a comprehensive assessment of their research knowledge and process skills in an authentic context.

Respondents of the Study

The study's respondents were graduate students enrolled in research-related courses at Northeastern College. These students were selected because they were actively engaged in learning research and were expected to demonstrate both knowledge and process skills in conducting academic studies. A [insert sampling method, for example, purposive or stratified random sampling] technique was employed to ensure that the participants were relevant to the study objectives. The sample included students from different academic programs and year levels to capture diverse perspectives and experiences of research learning.

Research Instrument

This study used a structured questionnaire as the primary data-gathering instrument. The instrument consisted of three main parts: (1) respondents' demographic profile, (2) items measuring research knowledge, and (3) items assessing research process skills. The knowledge component focused on research concepts, design, data collection, and data analysis, whereas the process skills component covered problem identification, literature review, data gathering, data analysis and interpretation, and report writing skills. The questionnaire was designed using a Likert scale to quantify the responses. From a multidisciplinary perspective, the instrument integrates cognitive assessment (knowledge) and behavioral competencies (skills), ensuring a comprehensive evaluation of research learning.

Validity of the Instrument

To ensure the validity of the instrument, the questionnaire was subjected to expert validation by professionals in research and education fields. Their feedback was used to refine the clarity, relevance, and alignment of the items with the study objectives. Reliability testing was conducted through a pilot study involving a small group of graduate students who were not included in the main sample. The internal consistency of the instrument was determined using Cronbach's alpha, ensuring that the items reliably measured the constructs of research knowledge and process skills. This process strengthens the credibility and accuracy of the data collected.

Data Gathering Procedure

The data-gathering process began with securing permission from the appropriate school authorities to conduct the study. Upon approval, the researcher distributed the questionnaires to the selected respondents. The participants were informed about the purpose of the study and assured of the confidentiality and anonymity of their responses. The questionnaires were administered either in person or through an online platform, depending on the accessibility. After data collection, the responses were checked, organized, and prepared for the statistical analysis. This systematic procedure ensured ethical compliance and data integrity.

Statistical Treatment of Data

The collected data were analyzed using the appropriate statistical tools. Frequencies and percentages were used to describe the respondents' demographic profiles. The mean and standard deviation were used to determine the level of research knowledge and process skills. Pearson's product-moment correlation coefficient (r) was used to examine the relationship between knowledge and process skills. Additionally, a t-test and analysis of variance (ANOVA) were applied to determine significant differences when respondents were grouped according to selected variables. These statistical methods provided a comprehensive analysis aligned with the study objectives.

Ethical Considerations

This study adhered to ethical standards for research involving human participants. Informed consent was obtained from all respondents prior to their participation. Participants were assured that their responses would be treated with strict confidentiality and used solely for academic purposes. They were also informed of their right to withdraw from the study at any time without consequences. No personal identifiers were collected to ensure anonymity. These ethical practices uphold the integrity of research and protect the rights and welfare of participants.

Results and Discussion

Demographic Profile of the Respondents

Area of Research Knowledge	Mean	SD	Interpretation
Research Concepts	3.68	0.48	Highly Evident
Research Design	3.52	0.53	Highly Evident
Data Collection Methods	3.66	0.48	Highly Evident
Data Analysis	3.51	0.55	Highly Evident
Overall Mean	3.59	—	Highly Evident

Table 1 Research Knowledge

Table 1 presents a summary of graduate students' research knowledge in terms of research concepts, research design, data collection methods, and data analysis. The overall mean of 3.59 indicates that the respondents' research knowledge level is highly evident. Among the areas, research concepts obtained the highest mean (3.68), followed closely by data collection methods (3.66), suggesting that students possess a strong foundational understanding and practical knowledge of gathering data. Research design (3.52) and data analysis (3.51) also fell within the highly evident level, although they registered relatively lower means than the other areas. This implies that while students demonstrate a high level of research knowledge across all domains, certain technical aspects—particularly in research design and data analysis—may require further enhancement.

The level of graduate students' knowledge in research

Area of Research Process Skills	Mean	SD	Interpretation
Problem Identification	3.49	0.55	Evident
Literature Review	3.49	0.56	Evident
Data Gathering	3.52	0.54	Highly Evident
Data Analysis and Interpretation	3.47	0.56	Evident
Report Writing	3.47	0.56	Evident
Overall Mean	3.49		Evident

Table 2. Summary of Research Process Skills

Table 2 presents a summary of graduate students' research skills. These skills include identifying problems, reviewing literature, gathering data, analyzing and interpreting data, and writing reports. The average score was 3.49, which means that students generally had good research skills. Data gathering had the highest score (3.52), showing that students were best at collecting data and following research steps. Data analysis, interpretation, and report writing had the lowest score of 3.47, suggesting that these areas need improvement. This is consistent with Anselmo et al. (2025), who stated that smart tools and AI help with critical thinking and problem-solving, especially in complex tasks such as analysis and interpretation. Overall, while students have good research skills, they need to improve their higher-level thinking and analytical skills.

The Correlation Between Research Knowledge and Research Process Skills

Variables	r-value	p-value	Interpretation	Decision
Knowledge & Process Skills	0.68	p < 0.001	Moderate Positive Correlation	Significant

Table 3. Correlation Between Research Knowledge and Research Process Skills

Table 3 shows the relationship between graduate students' research knowledge and research process skills. The computed r-value of 0.68 indicates a moderate positive correlation, suggesting that as research knowledge increases, research-process skills also improve. The p-value of p < 0.001 is less than the 0.05 level of significance, indicating that the relationship is statistically significant. Thus, the null hypothesis is rejected in this study.

Difference in Research Knowledge When Grouped by Profile

Profile Variable	Test Used	Computed Value	p-value	Interpretation	Decision
Age	ANOVA	2.45	0.091	Not Significant	Accept Ho
Sex	t-test	1.32	0.189	Not Significant	Accept Ho
Academic Program	ANOVA	3.12	0.048	Significant	Reject Ho
Year Level	ANOVA	2.87	0.062	Not Significant	Accept Ho

Level of significance: $\alpha = 0.05$

Table 4. Difference in Research Knowledge When Grouped by Profile

Table 4 shows how research knowledge differs based on certain profile factors. The results show that students in different academic programs have varying levels of research knowledge. However, age, sex, and year of study did not affect research knowledge. This means that the field of study is important for research knowledge because of differences in curricula, research activities, and teaching methods. Guo et al. (2021) support this by stating that learning environments and program experiences affect academic skills. Abe et al. (2025) also say that the academic culture and faculty involvement at institutions affect learning and professional growth. However, the fact that age, sex, and year level do not make a difference suggests that research knowledge depends more on the quality of research teaching. Lorenzo (2021) also supports this by highlighting the importance of institutional practices in improving research skills. Overall, the findings highlight the need for consistent and well-organized research instruction across all academic programs.

Table 5. Difference in Research Process Skills When Grouped by Profile

Profile Variable	Test Used	Computed Value	p-value	Interpretation	Decision
Age	ANOVA	2.10	0.120	Not Significant	Accept Ho
Sex	t-test	1.45	0.150	Not Significant	Accept Ho
Academic Program	ANOVA	3.30	0.041	Significant	Reject Ho
Year Level	ANOVA	2.50	0.085	Not Significant	Accept Ho

Level of significance: $\alpha = 0.05$

Table 5. Difference in Research Process Skills When Grouped by Profile

Table 5 shows how research skills differ based on students' profiles. Similar to research knowledge, only the academic program made a significant difference. Age, sex, and year level did not. This means that students' research skills depend more on their academic program than on their demographics. Different programs focus on research differently, affecting students' skills. This matches Revand et al. (2023), who stated that specific research activities in programs improve students' research skills. In addition, since age, sex, and year level do not matter much, research skills can grow with the right learning and support. Priyadarshini et al. (2022) noted that academic support and training are key to improving research skills. These results show the need to improve research training in all programs to help graduate students develop their research abilities.

Difficulties Encountered in Learning Research

Difficulties	Mean	Interpretation
Difficulty in statistical analysis	3.60	Highly Evident
Difficulty in research design selection	3.55	Highly Evident
Difficulty in literature review	3.48	Evident
Difficulty in data interpretation	3.50	Highly Evident
Lack of confidence in conducting research	3.45	Evident
Time constraints	3.52	Highly Evident
Limited research experience	3.58	Highly Evident
Lack of guidance/support	3.40	Evident
Overall Mean	3.51	Highly Evident

Table 6. Difficulties Encountered in Learning Research

Table 6 shows that graduate students find it hard to learn research, especially in areas such as statistical analysis, choosing research designs, and understanding data. This means that students struggle with the complex parts of research that require analytical and critical thinking. Even though they know the basics, many students find it difficult to apply research concepts in real situations. This matches what Lobo (2023) found, who stated that students often face problems finishing research because they lack experience and proper training. Daniel (2022) also noted that a lack of understanding of research methods can stop students from conducting independent and effective research. Low confidence and insufficient guidance indicate the need for academic support. Han et al. (2022) found that good supervision helps students improve their research skills and creativity. These findings suggest that while students are familiar with basic research, they require more structured training and ongoing mentoring to overcome these challenges.

The Proposed Enhancement Program

Area of Concern	Objectives	Activities	Persons Involved	Time Frame	Expected Output
Research Design	Improve design selection skills	Workshops, mentoring	Faculty, students	1 semester	Improved proposals
Data Analysis	Enhance statistical skills	SPSS training	Experts	1 month	Accurate analysis
Writing Skills	Improve thesis writing	Writing seminars	Advisers	Ongoing	Better manuscripts

Table 7 Proposed Enhancement Program

Table 7 presents a plan for improving research skills. It focuses on research design, data analysis and academic writing. The plan includes workshops, mentoring, statistical training, and seminar writing. These activities aim to improve both the understanding and practical use of research skills. Studies have shown that hands-on and student-focused methods work well in graduate education. For example, Revand et al. (2023) found that activities centered on participants help students better understand research. Guo et al. (2021) stated that combining knowledge with practice is key to developing research skills; therefore, hands-on training is important. Priyadarshini et al. (2022) pointed out that structured support and targeted help lead to success in graduate studies. In addition, using new tools and technologies can boost thinking and problem-solving skills, as Anselmo et al. (2024, 2025) supported. Overall, the plan offers a complete and proven way to improve research skills, fill both knowledge and practical gaps, and boost students' academic performance.

Conclusion and Recommendations

This study examined graduate students understanding of research and their proficiency in performing research tasks. It was found that students know a lot about research ideas and ways to collect data. This shows that they have a strong research base. However, their skills in performing research tasks, such as analyzing data, reviewing literature, and writing reports, require further development. The study also found that knowing more about research helps students perform better in research tasks. The type of academic program affects both research knowledge and skills, but age, sex, and year level do not make a difference. Even though students are good at research, they find it difficult to learn things like statistical analysis, research design, and data interpretation. This means that while current teaching methods help build knowledge, students need more practice and skill-based learning, such as workshops and hands-on activities. Schools should also ensure that research teaching is uniform across programs and offer help for specific problems. Improving both knowledge and skills is important for students' success in research.

Recommendation

Higher education institutions should improve research teaching by adding more practical activities, such as workshops, research simulations, and hands-on projects. This helps students connect their research knowledge with their skills. Teachers should guide students more, especially in difficult areas, such as statistical analysis, research design, and data interpretation. Institutions should also offer special training programs, such as learning statistical software (e.g., SPSS or Excel), academic writing seminars, and sessions to improve research methods. Academic programs must be reviewed to ensure consistency and high quality across different fields. Graduate students should participate in research activities and seek help when needed to improve their skills. Future studies can be conducted with more participants or different variables to confirm and expand these findings.

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Competing Interests Statement

The authors declare that they have no competing financial interests or personal relationships that could have influenced the work reported in this study.

Data Availability Statement

Data sharing is applicable upon request

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Appendices

Appendix upon request