RESEARCH SKILLS OF THE SENIOR PRE-SERVICE TEACHERS IN THE COLLEGE OF TEACHER EDUCATION

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ABSTRACT: *This study aimed to assess the research skills of senior pre-service teachers enrolled in the College of Teacher Education at Negros Oriental State University (NORSU) during the Academic Year 2023–2024. Guided by a synthesized theoretical framework combining DeKeyser's Skill Acquisition Theory, Burch's Conscious Competence Theory [12], and Bruner's Discovery Learning Theory [13], the study employed a mixed-methods approach. Data were collected from 210 fourth-year pre-service teachers across six programs— BSNEd, BECEd, BEEd, BSEd, BPEd, and BTLEd—using a research skills questionnaire measuring five key dimensions: problem identification and conceptualization, information and evidence seeking, research methodology, statistical/quantitative analysis and evidence evaluation, and communication and language use. Findings revealed that students performed better in Research 2 (Specialization Research Course) than in Research 1 (Methods of Research in Education). Overall, their research skills were rated as "Very Satisfactory" across dimensions, with notable strengths in writing research titles, gathering information, and following ethical standards. However, challenges were identified in formulating research hypotheses, arranging information systematically, and performing advanced statistical analyses. Among the programs, BSEd students consistently achieved the highest ratings, while BTLEd students scored the lowest. Statistical analysis showed minimal relationships between students' profiles (age, sex, and program) and their research skills. These findings underscore the need for targeted instructional interventions to address gaps in higher-order research competencies, such as conceptualizing research frameworks and applying statistical tools. The study contributes to improving teacher education programs by emphasizing the development of research skills critical to professional growth and lifelong learning.*

Keywords: Research skills, pre-service teachers, teacher education, mixed-methods research, problem identification, research methodology, statistical analysis, communication skills, skill acquisition theory, lifelong learning.**1.**

INTRODUCTION

A teacher's research skills are critical in enabling oneself to gain new information and maximize the potential for personal and professional development [1]. It is a personal quality that extends far beyond pedagogical innovation through the exploration and transformation of personal experiences and observation. For further social and economic developments to be realized, it is imperative for young people to be equipped by educational institutions with novel, relevant, and highly applicable sets of skills and competencies.

One of the 21st-century demands set forth by Partnership for 21st Century Skills is learning skills. It emphasizes the need for students to heighten their metacognitive skills to enable themselves to apply their knowledge and skills in different and new contexts, analyze situations, understand new ideas, communicate information, collaborate with experts, solve problems, and make decisions. What direct and stimulate learners to situations requiring critical thinking and problem-solving skills are research skills. These skills are gradually acquired when there are ample sets of research-oriented activities and experiences provided to students in hopes of helping them critically analyze problems, formulate hypotheses, decide methods, gather and evaluate data, and eventually arrive at conclusions [2]. Additionally, it is worth noting that the development of research skills should be aligned with the 21st-century demands so that individuals become ready to face the battles in the real world.

In the context of education, the ability to conduct and write research papers is a cornerstone for academic excellence and professional development. The literature review reiterated the vitality for teachers in the field to be equipped with research skills in navigating the inherent intricacies of the teaching and learning process. As prerequisite courses in the College of Teacher Education programs, pre-service teachers must take and pass two research subjects — Ed303 Methods of Research in Education and a research course per specialization. It is important to assess and validate whether after taking these two
courses, they have developed their research skills, thus this study.

This study aims to explore various aspects of student-teacher respondents' research skills and their potential relationships with specific demographic factors. Specifically, it seeks to answer the following key questions:

1. What is the student-teacher respondents' profile according to:

    1.1. age;

    1.2. sex;

    1.3. program taken; and

    1.4 grades in the two research subjects.

2. What is the level of research skills of the student-teacher respondents in terms of;

    2.1. problem identification and conceptualization;

    2.2. information and evidence seeking;

    2.3. research methodology;

    2.4. statistical/quantitative analysis and evidence evaluation; and

    2.5. communication and language use.

3. Is there a relationship between the respondents' profile and their level of research skills?

4. What are the challenges experienced by the student-teacher respondents in terms of problem identification and conceptualization skills, information and evidence seeking skills, research methodology skills, statistical/quantitative analysis and evidence evaluation skills, and communication and language skills; and,

5. What intervention programs are to be developed based on the findings?

2. REVIEW OF RELATED LITERATURE

Developing research skills among students in higher education has garnered significant attention globally, with numerous studies highlighting its importance for academic, professional, and societal growth. Research skills not only equip students with the tools to solve real-world problems but also enhance critical thinking, decision-making, and self-directed learning [3]. The following literature review synthesizes literature on research skills development, focusing on challenges, strategies, and outcomes, which align with the research objectives of this study.

The Importance of Research Skills in Teacher Education

Research skills are pivotal in preparing future educators to contribute to evidence-based practices and lifelong learning. According to DeKeyser's Skill Acquisition Theory [11], the progression from declarative to procedural knowledge is central to developing research competence. This aligns with Bruner's Discovery Learning Theory [13], which emphasizes the active construction of knowledge through inquiry and problem-solving. Studies like those of Shaik Rehana Banu et al. [4] reveal that undergraduate students often face challenges in areas such as literature review, hypothesis formulation, and methodological rigor. Similar issues have been observed in pre-service teachers, who struggle with the conceptualization of research topics, aligning with the findings of Fareed et al. [5].

In teacher education, these skills are essential for fostering reflective practice, as teachers are expected to engage in ongoing inquiry to improve classroom instruction. However, Medina Gordillo [6] emphasizes that novice university students often lack confidence and self-esteem in research, requiring targeted strategies to develop their capabilities.

Challenges in Developing Research Skills

Numerous studies have identified gaps in research competencies among undergraduate and postgraduate students. For instance, the study by Rajneesh Kaur et al. [7] on medical students noted that only 37% of students felt prepared for research before undertaking mandatory projects. Similarly, Medina Gordillo [6] highlights that new students often struggle with epistemological and methodological aspects of research. Common barriers include insufficient time allocated to research within curricula, lack of faculty support, and inadequate training in advanced tools such as SPSS or systematic databases like Scopus and Web of Science [4, 7]. Research by Vieno [3] underscores that addressing such challenges requires a broader definition of research skills, integrating technical and transferable competencies.

Effective Strategies for Enhancing Research Skills

Promising strategies for developing research skills include the integration of collaborative learning, case study methods, and scaffolded guidance. Medina Gordillo [6] advocates for the use of student guides and group counseling as effective methods to build confidence and competence in novice researchers. Similarly, Kaur et al. [7] emphasize the critical role of supportive supervisors and dedicated research blocks within busy academic schedules. Further, the adoption of frameworks like the Research Skill Development (RSD) framework has proven effective in postgraduate settings [8]. This framework helps students align their academic writing and critical thinking with systematic research practices, thereby enhancing self-regulation and metacognitive awareness. Additionally, collaborative research activities have been shown to boost early-career academics' self-confidence and generic skills [9]. Such collaborative approaches could be adapted to teacher education programs to foster a research-oriented culture.

Outcomes of Research Skills Development

Studies consistently highlight the positive impact of research skill development on students' academic and professional performance. Kaur et al. [7] report that 84% of medical students perceived significant improvement in their research skills after completing a mandatory project. Similarly, Medina Gordillo [6] found that integrating qualitative methodologies into the curriculum enabled students to apply research knowledge to real-world contexts effectively.

In teacher education, these outcomes are particularly relevant as they prepare pre-service teachers to engage in evidence-based practices. Sumarwati et al. [8] emphasize that research skills such as ethical inquiry, critical appraisal, and integrity are foundational for professional growth and societal contribution. The study suggests that areas such as statistical analysis and hypothesis formulation remain areas for improvement among pre-service teachers, reflecting findings from Peruvian university students who struggled with similar tasks [6].

Implications for Teacher Education Programs

The reviewed literature underscores the need for teacher education programs to prioritize research skills development. Incorporating tailored instructional strategies, such as case-based learning, collaborative projects, and digital tools, can address identified gaps in research competencies [7, 6]. Additionally, fostering a supportive learning environment that emphasizes ethical practices, metacognition, and confidence-building is crucial for empowering pre-service teachers to conduct meaningful research [3, 8].

The study contributes to this growing body of research by examining the specific research skills of senior pre-service teachers at Negros Oriental State University. The findings will provide valuable insights for curriculum developers and educators to enhance research training in teacher education programs.

3. Theoretical Framework

This study is anchored on DeKeyser's Skill Acquisition Theory [11], Burch's Conscious Competence Theory [12], and Bruner's Discovery Learning Theory [13].

DeKeyser's Skill Acquisition Theory [11] is a framework that explains how individuals learn and master various skills. It posits that the process of acquiring a certain skill progresses from an initial knowledge representation to an effortless, spontaneous, and highly skilled behavior. Taking its roots in various branches of psychology, spanning behaviorism, cognitivism, and connectionism and drawing on Anderson's Adaptive Control of Thought (ACT) model, this theory integrates cognitive stimulus-response principles [11, 14]. Additionally, Parziale and Fischer [15] pronounce the theory as a neo-Piagetian theory that amalgamates the elements of both cognitive and behavioristic approaches.

It is worth noting that Skill Acquisition Theory is relatively rampantly used in Second Language Acquisition (SLA) given its principles on implicit and explicit learning. Similar to writing research reports, articles, and the like,

individuals initially learn through explicit processes, then eventually transition to implicit processes for as long as sufficient practice and exposure are provided. The understanding of this theory could inform the study at hand of how senior pre-service teachers develop and refine their research skills over time. Taking this into account, the researcher can further explore how the respondents initially acquired research skills through explicit instruction and guidance. As they gain more experience and engagement in practical research activities (e.g., conducting studies and literature reviews), they eventually can transition to implicit learning processes where these research skills become more automatic and effortless.

The second theory on which the study is anchored is Burch's Conscious Competence Theory (CCT) [12] which relates to the psychological states involved in the process of progressing from incompetence to competence in a skill. He develops the Conscious Ladder which stresses two aspects, namely, consciousness level (awareness) and skills level (competence). According to Burch's [12] model people take the next step of the ladder as they move up with their awareness and competence, thus improving their performance over time. This model emphasizes the four levels through which people move as they build competence in a new skill. The first level is unconscious incompetence, where people do not know that they do not have this skill, or that they need to learn it. The second stage is conscious incompetence, wherein people at this level know that they do not have the expertise. Third, the conscious competence level is where people know that they have this skill. Finally, the unconscious competence level is where they do not see that they are using this skill and it seems natural and becomes part of their performance.

CCT is specially related to the study as it helps point out areas where the senior pre-service teachers may lack awareness of the research skill deficiencies (unconscious incompetence), where they recognize their shortcomings but lack proficiency (conscious incompetence), where they demonstrate competence but remain aware of their skills (conscious competence), and where their research skills become automatic and spontaneous (unconscious competence). This identification of skill gaps can inform the development of the intervention programs deemed necessary and useful for the improvement of students' research skills. The recognition of these competence stages helps tailor training and support to meet the specific needs and potentially address the challenges of the learners at different skill levels, ultimately enhancing their overall proficiency in conducting and writing research.

The third theory underpinning the study is Bruner's Discovery Learning Theory [13] which significantly aligns with constructivist teaching principles, emphasizing that students learn most effectively when engaged in active social learning experiences. These interactions allow them to construct new ideas by building upon their existing bodies of knowledge. Bruner further added that learning happens by discovering, which zeroes in on reflection, critical thinking, experimenting, and exploring. Such an idea was corroborated by Bok [16] who posited that the educational approach of discovery learning is closely linked with constructivist tenets emphasizing exploration, discovery, and innovation.

The study is informed by Bruner's Discovery Learning Theory [13] as it underscores the roles of active engagement and social interaction as crucial elements towards attaining effective learning. The understanding of this theory can significantly contribute to developing and designing learning experiences that promote active exploration, experimentation, and reflection as crucial qualities of an excellent researcher. Notably, this approach aligns with the current trend in 21st-century education where teachers are no longer the sage on the stage, but a guide on the side – a distinctive characteristic of constructivist classrooms. By providing opportunities for students to construct new knowledge based on their understanding through hands-on, interactive learning experiences, the study can help enhance the student's research skills. Moreover, it cannot be denied that Bruner's emphasis on discovery stimulates the development of critical thinking skills – a sine qua non in conducting and writing research.

Figure 1. Synthesized Framework of the Three Theories

Figure 1 exhibits the synthesized theoretical framework of the three selected theories, namely, DeKeyser's Skill Acquisition Theory [11], Burch's Conscious Competence Theory [12], and Bruner's Discovery Learning Theory [13] upon which the study is anchored. It illustrates how the theories interplay to assess and validate whether after taking the two research courses, the senior pre-service teachers of the College of Teacher Education have developed their research skills.

4. METHODOLOGY
Research Design
This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches to assess the research skills of senior pre-service teachers comprehensively. The quantitative component involved the use of a structured questionnaire to measure research skills across five dimensions. The qualitative aspect was through the open-ended questionnaire to gain deeper insights into the students' challenges and experiences in conducting research.

Research Respondents
The study was conducted at Negros Oriental State University (NORSU), focusing on its seven campuses across the province. These campuses offer programs under the College of Teacher Education (CTE), making them ideal for studying the research skills of pre-service teachers enrolled in the university's teacher education programs.

Population
The study targeted the entire population of senior pre-service teachers in the College of Teacher Education (CTE) at NORSU during the Academic Year 2023–2024. This population consisted of fourth-year students who had completed two required research courses:

Research 1 (Methods of Research in Education), and Research 2 (Specialization Research Course).

The total population comprised 210 pre-service teachers enrolled across six academic programs:

Bachelor of Secondary Education (BSEd)

Bachelor of Elementary Education (BEEd)

Bachelor of Early Childhood Education (BECEd)

Bachelor of Technology and Livelihood Education (BTLEd)

Bachelor of Physical Education (BPEd)

Bachelor of Special Needs Education (BSNEd)

As the study encompassed the entire population, no sampling techniques were used, ensuring a comprehensive analysis of the research skills of all senior pre-service teachers.

Research Instruments

The primary tool for data collection was a structured questionnaire, designed to assess research skills across five dimensions: Problem Identification and Conceptualization; Information and Evidence-seeking; Research Methodology; Statistical/Quantitative Analysis, and Evidence Evaluation; and Communication and Language. An open-ended questionnaire was designed to gather challenges encountered in the different dimensions. This modified research instrument was based on the Research Skill Scale for Senior High School Students by Lacson and Dejos [10].

Research Methodology

Statistical/Quantitative Analysis and Evidence Evaluation

Communication and Language Use

The questionnaire employed a five-point Likert scale, ranging from 1 (Poor) to 5 (Outstanding). For the qualitative component, semi-structured interview guides were used to elicit insights into students' challenges and successes in research.

Data Collection Procedures

Survey Administration: The questionnaire was distributed to all senior pre-service teachers during their regular class hours, ensuring maximum participation.

Ethical Considerations: Informed consent was obtained from all respondents. Confidentiality of responses was assured, and participation was voluntary.

Data Analysis

Quantitative Data: Responses from the questionnaires were analyzed using descriptive statistics (mean, standard deviation) to determine overall research skills and identify areas for improvement. ANOVA was conducted to compare results across the six programs.

Qualitative Data: Data from open-ended questions were analyzed using thematic analysis to identify recurring themes, challenges, and best practices in the development of research skills.

RESULTS AND DISCUSSION

Table 1.1 Frequency distribution of the respondents in terms of age

Age	Frequency	Percent
20-24	197	94%
25-29	9	4%
30-34	4	2%
35-39	0	0%
40-44	0	0%
	210	100%

Table 1.1 reflects the frequency distribution of the respondents' age. Of the 210 respondents, 94% belong to the 20-24 age range, while some 9% and 4% belong to 25-29 and 30-34 age ranges, respectively. This suggests that majority of the senior enrollees in the College of Teacher Education are young adults.

Table 1.2 Frequency distribution of the respondents in terms of sex

Sex	Frequency	Per cent
Male	49	23%
Female	161	77%
	210	100%

Table 1.2 presents the frequency distribution of the respondents in terms of sex. Out of the total 210 senior pre-service teacher respondents, 161 (77%) were female, while 49 (23%) were male. This distribution reflects a clear gender disparity, with a significantly higher proportion of females compared to males.

The predominance of female respondents aligns with existing trends in teacher education programs, where females typically outnumber males. According to Fareed et al. [5], gender disparity in teacher education is often attributed to societal perceptions and stereotypes that associate teaching with a nurturing and caregiving role, which is traditionally seen as feminine. This observation is consistent with findings from Banu et al. [4], who noted that female students tend to dominate education-related fields, particularly in undergraduate teacher preparation programs.

Moreover, the higher representation of females in this study suggests that interventions aimed at enhancing research skills in teacher education should be tailored to consider gender-specific needs and learning styles. This is supported by the findings of Sumarwati et al. [8], which emphasize the importance of gender-responsive research training approaches to foster equity in skill development.

In contrast, the underrepresentation of males indicates a potential need for initiatives that encourage greater male participation in teacher education programs. Strengthening male enrollment and engagement in these programs may help address the gender imbalance in the teaching workforce [6].

Table 1.3 Frequency distribution of the respondents in terms of college programs

Program	Frequency	Percent
BSEd	99	47%
BSNEd	17	8%
BECEd	14	7%
BEEd	36	17%
BPEd	20	10%
BTLEd	24	11%
	210	100%

The distribution of respondents based on their college programs, as shown in Table 1.3, reveals that the majority (47%) are enrolled in the Bachelor of Secondary Education (BSEd) program. This significant representation reflects the program's popularity and its larger enrollment size within teacher education, as secondary education programs typically attract more students due to the diversity of specializations they offer. According to Fareed et al. [5], the demand for secondary education teachers continues to drive higher enrollment in such programs.

In contrast, specialized programs such as the Bachelor of Early Childhood Education (BECEd) and Bachelor of Special Needs Education (BSNEd) account for the smallest shares of respondents, with 7% and 8%, respectively. These lower numbers align with trends noted by Gordillo [6], who explained that niche teaching programs tend to attract fewer students due to their focused career paths and the limited demand for educators in these specialized fields.

Other programs, such as the Bachelor of Technology and Livelihood Education (BTLEd) and Bachelor of Physical Education (BPEd), represent 11% and 10% of the respondents, respectively. These programs highlight the growing need for educators in areas like technology-focused teaching and physical education, which have gained importance in recent years [8]. The Bachelor of Elementary Education (BEEd) program accounts for 17% of the respondents, reflecting its consistent demand for preparing future elementary-level educators.

Table 1.4 Profile of the respondents in terms of their grades in research subjects

	Subjects			
	Research 1		Research 2	
	Grade in Ed 303 (Methods of Research in Education)		**Grade in Specialization Research Course**	
Program	Mean	SD	Mean	SD
BSEd	87.313	1.899	91.222	2.746
BSNEd	87.059	1.435	88.588	2.093
BECEd	86.500	1.401	88.643	3.365
BEEd	86.167	2.131	92.056	2.596
BPEd	85.550	2.395	93.250	1.482
BTLEd	85.458	0.721	89.792	1.978

The data presented in the table comparing the respondents' grades in Research 1 (Methods of Research in Education) and Research 2 (Specialization Research Course) across different programs indicates a noticeable improvement in performance from the foundational research course (Research 1) to the specialization course (Research 2).

For the Bachelor of Secondary Education (BSEd) program, students scored an average of 87.313 in Research 1, with a standard deviation of 1.899, and 91.222 in Research 2, with a higher standard deviation of 2.746. This shows that while students in BSEd improved significantly in their specialized research course, there is a greater spread of scores, indicating more variation in their performance.

The Bachelor of Special Needs Education (BSNEd) students scored 87.059 (SD = 1.435) in Research 1 and 88.588 (SD = 2.093) in Research 2, demonstrating a moderate increase in their research performance. The relatively small increase in mean score and the low standard deviation in Research 1 suggest a more uniform grasp of the material, though their scores showed slightly more variation in Research 2.

In the Bachelor of Early Childhood Education (BECEd) program, students scored 86.500 (SD = 1.401) in Research 1 and 88.643 (SD = 3.365) in Research 2. The performance improvement is clear, but the larger standard deviation in Research 2 implies a wider range of skill development among the students.

For the Bachelor of Elementary Education (BEEd) students, the scores were 86.167 (SD = 2.131) in Research 1 and 92.056 (SD = 2.596) in Research 2. BEEd students demonstrated a strong improvement, with the mean score jumping by over five points, suggesting a significant advancement in their research skills after completing the specialization course. The relatively higher standard deviation in both courses indicates some variability in the student's performance.

The Bachelor of Physical Education (BPEd) students showed the most substantial increase, with an average of 85.550 (SD = 2.395) in Research 1 and 93.250 (SD = 1.482) in Research 2. This indicates a significant improvement in research skills, with a lower standard deviation in Research 2, suggesting that more students in this group performed at a higher and more consistent level in the specialization course.

Finally, the Bachelor of Technology and Livelihood Education (BTLEd) students had a mean of 85.458 (SD = 0.721) in Research 1 and 89.792 (SD = 1.978) in Research 2. The BTLEd students demonstrated an improvement, though their increase in mean score is less pronounced compared to other programs. The low standard deviation in Research 1 highlights a high level of consistency in performance among students in this program, while the higher standard deviation in Research 2 indicates some variation in their advancement.

In conclusion, students across all programs showed improved research skills in Research 2, particularly in their specialized areas. This supports the findings of Banu et al. [4], which suggest that research courses, especially specialized ones, significantly enhance students' research capabilities. The results also align with Sumarwati et al. [8], emphasizing the importance of tailoring research instruction to the specific needs of each program.

Table 2.1 Respondents' research skills in problem identification and conceptualization

Research Skill Statements	BSNEd	BECEd	BEEd	BSEd	BPEd	BTLEd	Overall Mean
	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Overall SD
1. If confronted by a question/problem, I can see it as an opportunity to do research.	3.94 *(GT)* 0.83 *(HM)*	4.07 *(GT)* 0.73 *(HM)*	4.14 *(GT)* 0.59 *(HM)*	4.05 *(GT)* 0.68 *(HM)*	3.95 *(GT)* 0.76 *(HM)*	3.96 *(GT)* 0.62 *(HM)*	**4.01** *(GT)* **0.70** *(HM)*
2. I can identify and ask useful, challenging questions; always curious.	3.88 *(GT)* 0.60 *(HM)*	3.93 *(GT)* 1.00 *(HM)*	3.75 *(GT)* 0.55 *(HM)*	3.84 *(GT)* 0.62 *(HM)*	3.90 *(GT)* 0.85 *(HM)*	3.54 *(GT)* 0.59 *(HM)*	**3.81** *(GT)* **0.70** *(HM)*
3. I can formulate my research topic/problem based on related literatures and other sources.	3.94 *(GT)* 0.90 *(HM)*	3.86 *(GT)* 1.03 *(HM)*	3.92 *(GT)* 0.55 *(HM)*	3.81 *(GT)* 0.75 *(HM)*	3.80 *(GT)* 0.77 *(HM)*	3.50 *(GT)* 0.59 *(HM)*	**3.81** *(GT)* **0.77** *(HM)*
4. I can write a research title.	3.88 *(GT)* 0.78 *(HM)*	4.07 *(GT)* 1.38 *(HM)*	4.28 *(CT)* 0.74 *(HM)*	4.06 *(GT)* 0.78 *(HM)*	4.10 *(GT)* 0.72 *(HM)*	3.92 *(GT)* 0.78 *(HM)*	**4.05** *(GT)* **0.86** *(HM)*
5. I can create mind or concept mapping of my research	3.65 *(GT)* 0.70 *(HM)*	3.93 *(GT)* 1.14 *(HM)*	4.06 *(GT)* 0.71 *(HM)*	3.74 *(GT)* 0.72 *(HM)*	3.60 *(GT)* 0.68 *(HM)*	3.50 *(GT)* 0.51 *(HM)*	**3.75** *(GT)* **0.74** *(HM)*

topic/problem.

Research Skill Statement	BSNEd	BECEd	BEEd	BSEd	BPEd	BTLEd	Overall Mean
6. I can generate research questions based on the topic/problem.	3.88 (GT) 0.93 (HM)	3.86 (GT) 1.10 (HM)	4.19 (GT) 0.71 (HM)	4.03 (GT) 0.65 (HM)	3.95 (GT) 0.83 (HM)	4.08 (GT) 0.72 (HM)	4.00 (GT) 0.82 (HM)
7. I can justify the reasons for conducting the research.	3.82 (GT) 1.01 (HM)	3.86 (GT) 1.03 (HM)	4.11 (GT) 0.62 (HM)	4.07 (GT) 0.69 (HM)	3.95 (GT) 0.69 (HM)	3.92 (GT) 0.58 (HM)	3.96 (GT) 0.77 (HM)
8.I can formulate my research hypotheses.	3.65 (GT) 0.79 (HM)	3.57 (GT) 1.02 (HM)	3.92 (GT) 0.69 (HM)	3.79 (GT) 0.72 (HM)	3.60 (GT) 0.75 (HM)	3.63 (GT) 0.58 (HM)	3.69 (GT) 0.76 (HM)
9. I can elaborate key variable in my research topic.	3.76 (GT) 0.83 (HM)	3.50 (GT) 1.22 (HM)	3.89 (GT) 0.67 (HM)	3.84 (GT) 0.71 (HM)	3.70 (GT) 0.73 (HM)	3.50 (GT) 0.59 (HM)	3.70 (GT) 0.79 (HM)
10. I can indicate the scope and delimitation of my research.	3.88 (GT) 0.99 (HM)	3.93 (GT) 1.07 (HM)	4.14 (GT) 0.76 (HM)	4.09 (GT) 0.69 (HM)	4.15 (GT) 0.67 (HM)	3.79 (GT) 0.78 (HM)	4.00 (GT) 0.83 (HM)
Overall	**3.83** (GT) **0.84** (HM)	**3.86** (GT) **1.07** (HM)	**4.04** (GT) **0.66** (HM)	**3.93** (GT) **0.47** (HM)	**3.87** (GT) **0.74** (HM)	**3.73** (GT) **0.63** (HM)	**3.88** (GT) **0.77** (HM)

Legend:
Weighted Mean:
4.21 – 5.00 Certainly True (CT) - (Outstanding)
3.41 – 4.20 Generally True (GT) - (Very Satisfactory)
2.61 – 3.40 Somewhat True (ST) - (Satisfactory)
1.81 – 2.60 Generally False (GF) - (Fairly Satisfactory)
1.00 – 1.80 Always False (AF) - (Poor)
Standard Deviation:
sd ≤ 3.00 Homogeneous (HM)
sd > 3.00 Heterogeneous (HT)

In examining the research skills of senior pre-service teachers in the College of Teacher Education, it is clear that problem identification and conceptualization skills are critical in the research process. According to the results from the study, students generally demonstrated satisfactory proficiency in various aspects of problem identification and conceptualization, with an overall mean rating of 3.88, indicating that their skills were "generally true" (Very Satisfactory). The highest-rated item across all groups was the ability to see a research problem as an opportunity, with a mean of 4.01 (Outstanding). This suggests that students were generally able to approach problems with a research-oriented mindset, a critical aspect of research competence.

However, there were notable variations across the different teacher education programs. For example, the Bachelor of Science in Education (BSEd) group had the highest overall mean (4.04), suggesting that they had relatively stronger skills in this area, while the Bachelor of Technology and Livelihood Education (BTLEd) group had the lowest (3.73), reflecting some challenges in problem identification. Specific tasks such as formulating research hypotheses and justifying the reasons for conducting research were areas where many students showed room for improvement. The mean score for hypothesis formulation was 3.69, suggesting that students had difficulty with this complex task, a challenge also observed by Fareed et al. [5], who noted that students often struggle with the conceptualization of research problems and hypotheses.

Furthermore, the ability to create mind maps or concept maps to organize research topics was also identified as an area for improvement, with the overall mean score for this skill at 3.75, indicating that while students were somewhat confident in this area, they still needed further guidance. This finding aligns with the observations made in previous research on undergraduate students' difficulties with research skills, such as in Banu et al.'s [4] study, which highlighted the gap in students' methodological and information-seeking skills.

In conclusion, while students displayed generally satisfactory research skills in problem identification and conceptualization, there is a clear need for targeted instructional interventions to strengthen their ability to formulate hypotheses, create concept maps, and deepen their understanding of research problems. This reflects the findings from studies like those by Vieno [3], which emphasized the importance of explicit skill development in research courses to better prepare students for the complexities of academic research.

Table 2.2 Respondents' research skills in information and evidence-seeking

Research Skill Statements	BSNEd	BECEd	BEEd	BSEd	BPEd	BTLEd	Overall Mean
	Mean	Mean	Mean	Mean	Mean	Mean	Overall SD
1. I can gather information about my research topic through various means (e.g., electronic media, images, audio, and video).	4.24 (GT) 1.15 (HM)	4.00 (GT) 1.18 (HM)	4.61 (CT) 0.64 (HM)	4.37 (CT) 0.79 (HM)	4.65 (CT) 0.59 (HM)	4.08 (GT) 1.06 (HM)	**4.33** (CT) **0.90** (HM)
2. I can identify and access appropriate bibliographical resources, archives, and other sources of relevant information (including web-based resources, primary sources, and repositories).	4.06 (GT) 0.90 (HM)	3.86 (GT) 0.77 (HM)	4.28 (CT) 0.66 (HM)	4.02 (GT) 0.67 (HM)	3.65 (GT) 0.67 (HM)	3.63 (GT) 0.71 (HM)	**3.92** (GT) **0.73** (HM)
3. I can assess the reliability, reputation, currency, authority, and relevance of sources.	3.76 (GT) 0.90 (HM)	3.86 (GT) 0.53 (HM)	4.03 (GT) 0.70 (HM)	3.78 (GT) 0.76 (HM)	3.85 (GT) 0.99 (HM)	3.50 (GT) 0.72 (HM)	**3.80** (GT) **0.77** (HM)
4. I can evaluate the accurateness of the content by reading other sources mentioned by the writer.	3.71 (GT) 0.77 (HM)	3.79 (GT) 0.70 (HM)	4.22 (CT) 0.64 (HM)	3.80 (GT) 0.70 (HM)	3.70 (GT) 0.86 (HM)	3.63 (GT) 0.71 (HM)	**3.81** (GT) **0.73** (HM)
5. When searching for information, I can arrange each item systematically.	3.47 (GT) 1.01 (HM)	3.86 (GT) 0.95 (HM)	4.00 (GT) 0.68 (HM)	3.70 (GT) 0.76 (HM)	3.50 (GT) 0.89 (HM)	3.46 (GT) 0.66 (HM)	**3.67** (GT) **0.83** (HM)
6. I write down the important concepts myself using my own words to support my topic.	3.94 (GT) 0.83 (HM)	3.79 (GT) 1.05 (HM)	4.06 (GT) 0.71 (HM)	3.89 (GT) 0.68 (HM)	3.85 (GT) 0.81 (HM)	3.54 (GT) 0.59 (HM)	**3.85** (GT) **0.78** (HM)

Research Skill Statement	BSNEd	BECEd	BEEd	BSEd	BPEd	BTLEd	Overall
7. I can use the main ideas obtained from the information researched to support my topic.	4.00 (GT) 0.87 (HM)	3.71 (GT) 1.33 (HM)	4.31 (CT) 0.52 (HM)	4.10 (GT) 0.63 (HM)	3.95 (GT) 0.69 (HM)	3.79 (GT) 0.83 (HM)	3.98 (GT) 0.81 (HM)
8. I can combine the main ideas from one source or more to form a new idea.	3.88 (GT) 0.93 (HM)	3.71 (GT) 1.27 (HM)	4.39 (CT) 0.64 (HM)	3.99 (GT) 0.72 (HM)	3.85 (GT) 0.59 (HM)	3.75 (GT) 0.85 (HM)	3.93 (GT) 0.83 (HM)
9. I can write my references in any citation and referencing format or style.	4.12 (GT) 0.93 (HM)	3.50 (GT) 1.09 (HM)	4.17 (GT) 0.74 (HM)	4.01 (GT) 0.71 (HM)	4.05 (GT) 0.83 (HM)	3.75 (GT) 0.90 (HM)	3.93 (GT) 0.87 (HM)
10. I follow ethical standards in writing related literature.	3.88 (GT) 0.93 (HM)	4.14 (GT) 0.86 (HM)	4.42 (CT) 0.65 (HM)	4.16 (GT) 0.75 (HM)	4.05 (GT) 0.76 (HM)	3.92 (GT) 0.83 (HM)	4.10 (GT) 0.80 (HM)
Overall	**3.91 (GT) 0.92 (HM)**	**3.82 (GT) 0.97 (HM)**	**4.25 (CT) 0.66 (HM)**	**3.98 (GT) 0.51 (HM)**	**3.91 (GT) 0.77 (HM)**	**3.70 (GT) 0.79 (HM)**	**3.93 (GT) 0.80 (HM)**

The research skills of senior pre-service teachers in the area of information and evidence seeking revealed generally satisfactory results, with an overall mean rating of 3.93 (Very Satisfactory) and a standard deviation of 0.80, indicating a relatively homogeneous performance across the teacher education programs. Among the ten skill areas assessed, the ability to gather information about a research topic through various means, such as electronic media, images, audio, and video, received the highest mean score of 4.33 (Outstanding), underscoring the students' strength in utilizing diverse sources of information. This aligns with the findings of Vieno [3], who emphasized the importance of critical appraisal and information synthesis as foundational research skills.

Students also demonstrated commendable proficiency in following ethical standards when writing related literature (mean = 4.10) and in writing references using various citation and referencing formats (mean = 3.93). These skills are critical for maintaining academic integrity and are indicative of a solid understanding of research conventions. However, the ability to systematically arrange information when searching for sources was identified as an area for improvement, receiving the lowest mean score of 3.67. This finding echoes the challenges highlighted by Banu et al. [4], who reported gaps in information-seeking skills, particularly in organizing and evaluating sources.

Program-specific data revealed that the Bachelor of Early Childhood Education (BEEd) students performed best overall in this dimension, with a mean of 4.25 (Outstanding), while the Bachelor of Technology and Livelihood Education (BTLEd) students had the lowest mean at 3.70 (Very Satisfactory). This disparity suggests that tailored instructional strategies may be necessary to address the specific needs of underperforming groups. Furthermore, assessing the reliability, reputation, currency, authority, and relevance of sources posed challenges for many students, with a mean score of 3.80, reinforcing the need for enhanced training in critical evaluation techniques. Overall, while senior pre-service teachers exhibited strong foundational skills in gathering and referencing information, further interventions are required to improve

their ability to systematically organize information and critically assess source reliability. These findings are consistent with Sumarwati et al. [8], who emphasized the importance of equipping students with inference and evaluation skills to enhance their research capabilities.

Table 2.3 Respondents' research skills in research methodology

Research Skill Statements	BSNEd Mean	BECEd Mean	BEEd Mean	BSEd Mean	BPEd Mean	BTLEd Mean	Overall Mean / Overall SD
1. I can formulate a conceptual framework.	3.71 (GT) 0.77 (HM)	3.64 (GT) 1.01 (HM)	3.78 (GT) 0.72 (HM)	3.73 (GT) 0.71 (HM)	3.55 (GT) 0.69 (HM)	3.33 (ST) 0.48 (HM)	**3.62 (GT) 0.73 (HM)**
2. I can plan and design the research process of a research topic.	3.65 (GT) 0.61 (HM)	3.71 (GT) 0.91 (HM)	3.94 (GT) 0.63 (HM)	3.68 (GT) 0.68 (HM)	3.75 (GT) 0.85 (HM)	3.42 (GT) 0.50 (HM)	**3.70 (GT) 0.70 (HM)**
3. I can determine the appropriate research design or method of my research.	3.47 (GT) 0.72 (HM)	3.71 (GT) 0.73 (HM)	3.86 (GT) 0.54 (HM)	3.58 (GT) 0.64 (HM)	3.65 (GT) 0.75 (HM)	3.42 (GT) 0.65 (HM)	**3.62 (GT) 0.68 (HM)**
4. I understand relevant research methodologies and techniques and their appropriate application within own research area.	3.82 (GT) 0.95 (HM)	3.93 (GT) 0.83 (HM)	3.81 (GT) 0.71 (HM)	3.77 (GT) 0.74 (HM)	3.65 (GT) 0.88 (HM)	3.58 (GT) 0.65 (HM)	**3.76 (GT) 0.80 (HM)**
5. I can justify the principles and experimental techniques used in own research.	3.82 (GT) 0.64 (HM)	3.71 (GT) 0.61 (HM)	3.64 (GT) 0.64 (HM)	3.72 (GT) 0.73 (HM)	3.50 (GT) 0.83 (HM)	3.50 (GT) 0.59 (HM)	**3.65 (GT) 0.67 (HM)**
6. I can select and develop a research instrument to gather necessary data for my research.	4.18 (GT) 0.81 (HM)	3.93 (GT) 1.07 (HM)	3.86 (GT) 0.72 (HM)	3.90 (GT) 0.78 (HM)	3.85 (GT) 0.93 (HM)	3.83 (GT) 0.76 (HM)	**3.93 (GT) 0.85 (HM)**
7. I can determine my appropriate respondents and number of participants necessary for my research.	4.24 (CT) 0.97 (HM)	3.86 (GT) 1.10 (HM)	4.19 (GT) 0.52 (HM)	4.10 (GT) 0.75 (HM)	4.40 (CT) 0.68 (HM)	3.83 (GT) 0.92 (HM)	**4.10 (GT) 0.82 (HM)**
8. I understand and apply the relevant codes of conduct and guidelines for the ethical conduct of research; seeks advice from supervisor.	4.18 (GT) 0.95 (HM)	3.86 (GT) 1.23 (HM)	4.28 (GT) 0.66 (HM)	4.19 (GT) 0.82 (HM)	4.30 (CT) 0.73 (HM)	3.63 (GT) 0.88 (HM)	**4.07 (GT) 0.88 (HM)**

	BSNEd	BECEd	BEEd	BSEd	BPEd	BTLEd	Overall
9. I have basic understanding of legal requirements surrounding research, e.g., the Data Protection Act, Freedom of Information Act.	3.94 *(GT)* 0.83 *(HM)*	3.93 *(GT)* 1.21 *(HM)*	4.08 *(GT)* 0.77 *(HM)*	4.00 *(GT)* 0.87 *(HM)*	3.90 *(GT)* 1.02 *(HM)*	3.96 *(GT)* 0.69 *(HM)*	**3.97 *(GT)* 0.90 *(HM)***
Overall	**3.89 *(GT)* 0.80 *(HM)***	**3.81 *(GT)* 0.97 *(HM)***	**3.94 *(GT)* 0.66 *(HM)***	**3.85 *(GT)* 0.54 *(HM)***	**3.84 *(GT)* 0.82 *(HM)***	**3.61 *(GT)* 0.68 *(HM)***	**3.82 *(GT)* 0.75 *(HM)***

The findings reveal notable trends in research skills related to research methodology across the six programs (BSNEd, BECEd, BEEd, BSEd, BPEd, and BTLEd). Overall, students demonstrated strengths in determining appropriate respondents and the number of participants necessary for their research, with a high mean score of 4.10. BPEd students scored highest in this area (mean = 4.40), while BTLEd students scored lowest (mean = 3.83). Another area of strength was understanding and applying relevant codes of conduct and ethical guidelines in research, which achieved an overall mean of 4.07. BPEd again performed well, scoring 4.30, while BTLEd struggled in this domain with a mean score of 3.63. These findings align with Sumarwati et al. [8], who emphasized that ethical and methodological competencies are critical for postgraduate and undergraduate students alike, as they foster personal integrity and accountability in research. However, there are areas requiring improvement, particularly in formulating conceptual frameworks, which had the lowest overall mean of 3.62. BTLEd students struggled the most with this skill, scoring only 3.33, indicating significant challenges in this area. Similarly, determining appropriate research designs or methods also showed lower proficiency, with an overall mean of 3.62. BTLEd and BSNEd students performed the weakest in this skill, scoring 3.42 and 3.47, respectively. This echoes findings from Banu et al. [4], who highlighted that insufficient foundational skills in research methodologies hinder students' ability to conceptualize their studies effectively.

The data also revealed homogeneity in skill assessments, as reflected in standard deviation values ranging from 0.54 to 0.97. BEEd students demonstrated the most consistent responses (SD = 0.54), while BECEd students showed higher variability (SD = 0.97), suggesting diverse levels of confidence within the latter group. Among the programs, BEEd emerged as the top performer with the highest overall mean of 3.94, showcasing consistent strength across all skills, especially in determining respondents and understanding legal requirements. Conversely, BTLEd recorded the lowest overall mean of 3.61, consistently underperforming in most skill areas. Such gaps in competencies align with Vieno [3] who noted that students often struggle with technical research skills, such as identifying appropriate methodologies and frameworks, which require targeted curricular interventions.

Overall, students displayed competence in areas such as selecting participants, ethical research practices, and developing research instruments. However, weaknesses in conceptual framework formulation, research design selection, and justifying research techniques highlight opportunities for improvement. As Fareed et al. [5]

observed, students often encounter difficulties in research conceptualization due to limited scaffolding during earlier stages of their academic journey. Targeted interventions, such as workshops on conceptual framework development and hands-on training in research design, are recommended to address these gaps. Additionally, fostering collaborative environments, as suggested by Mydin et al. [9], could further enhance students' methodological skills through mentorship and research collaboration. With these enhancements, students can further strengthen their methodological competencies and overall research capabilities, paving the way for more rigorous and impactful academic outputs.

Table 2.4 Respondents' research skills in statistical/quantitative analysis and evidence evaluation

Research Skill Statements	BSNEd Mean	BECEd Mean	BEEd Mean	BSEd Mean	BPEd Mean	BTLEd Mean	Overall Mean Overall SD
1. I can observe and collect the necessary data.	4.00 *(GT)* 1.17 *(HM)*	3.93 *(GT)* 1.38 *(HM)*	4.25 *(CT)* 0.65 *(HM)*	4.15 *(GT)* 0.79 *(HM)*	4.20 *(GT)* 0.52 *(HM)*	3.75 *(GT)* 0.68 *(HM)*	**4.05 *(GT)* 0.87 *(HM)***
2. I can determine which statistical tool or method analysis to use for my research.	3.71 *(GT)* 0.77 *(HM)*	3.79 *(GT)* 1.19 *(HM)*	3.86 *(GT)* 0.64 *(HM)*	3.63 *(GT)* 0.78 *(HM)*	3.35 *(ST)* 0.75 *(HM)*	3.33 *(ST)* 0.56 *(HM)*	**3.61 *(GT)* 0.78 *(HM)***
3. I can perform common statistical tools in any statistical applications like MS Excel, SPSS, Minitab, or other apps.	3.59 *(GT)* 0.80 *(HM)*	3.57 *(GT)* 1.22 *(HM)*	3.81 *(GT)* 0.67 *(HM)*	3.56 *(GT)* 0.82 *(HM)*	3.30 *(ST)* 1.03 *(HM)*	3.42 *(GT)* 0.83 *(HM)*	**3.54 *(GT)* 0.90 *(HM)***
4. I can analyze and interpret the results of my statistical treatment or method analysis.	3.59 *(GT)* 0.87 *(HM)*	3.57 *(GT)* 0.85 *(HM)*	3.92 *(GT)* 0.73 *(HM)*	3.64 *(GT)* 0.75 *(HM)*	3.35 *(GT)* 0.99 *(HM)*	3.46 *(GT)* 0.66 *(HM)*	**3.59 *(GT)* 0.81 *(HM)***
5. I can evaluate and systematically organize the data I have gathered.	3.76 *(GT)* 0.83 *(HM)*	3.86 *(GT)* 0.95 *(HM)*	4.03 *(GT)* 0.70 *(HM)*	3.85 *(GT)* 0.63 *(HM)*	3.60 *(GT)* 0.88 *(HM)*	3.50 *(GT)* 0.93 *(HM)*	**3.77 *(GT)* 0.82 *(HM)***
6. I can conclude patterns and themes gathered from the data.	3.71 *(GT)* 0.85 *(HM)*	3.86 *(GT)* 1.23 *(HM)*	4.17 *(GT)* 0.74 *(HM)*	3.97 *(GT)* 0.75 *(hm)*	3.85 *(GT)* 0.81 *(HM)*	3.75 *(GT)* 0.68 *(HM)*	**3.89 *(GT)* 0.84 *(HM)***

7. I can organize and interpret data using tables and graphs.	4.12 (GT) 0.86 (HM)	3.93 (GT) 1.07 (HM)	4.19 (GT) 0.79 (HM)	3.99 (GT) 0.74 (HM)	3.95 (GT) 0.69 (HM)	3.58 (GT) 0.78 (HM)	3.96 (GT) 0.82 (HM)
Overall	3.78 (GT) 0.88 (HM)	3.79 (GT) 1.13 (HM)	4.03 (GT) 0.70 (HM)	3.83 (GT) 0.55 (HM)	3.66 (GT) 0.81 (HM)	3.54 (GT) 0.73 (HM)	3.77 (GT) 0.80 (HM)

Table 2.5 Respondents' research skills in communication and language use

Research Skill Statements	BSNEd Mean	BECEd Mean	BEEd Mean	BSEd Mean	BPEd Mean	BTLEd Mean	Overall Mean
1. I have excellent knowledge of the language(s) appropriate for research, including technical language.	3.65 (GT) 0.70 (HM)	3.93 (GT) 1.07 (HM)	3.75 (GT) 0.55 (HM)	3.77 (GT) 0.74 (HM)	3.75 (GT) 0.72 (HM)	3.42 (GT) 0.50 (HM)	3.71 (GT) 0.71 (HM)
2. I can understand, interpret, create, and communicate appropriately within an academic context.	3.82 (GT) 0.73 (HM)	4.00 (GT) 0.88 (HM)	3.94 (GT) 0.71 (HM)	3.91 (GT) 0.73 (HM)	3.65 (GT) 0.67 (HM)	3.46 (GT) 0.59 (HM)	3.80 (GT) 0.72 (HM)
3. I can prepare grammatically and syntactically correct content for presentations.	3.47 (GT) 0.72 (HM)	3.86 (GT) 0.86 (HM)	3.64 (GT) 0.59 (HM)	3.81 (GT) 0.80 (HM)	3.60 (GT) 0.82 (HM)	3.50 (GT) 0.83 (HM)	3.65 (GT) 0.77 (HM)
4. I can communicate research results clearly.	3.59 (GT) 0.51 (HM)	3.93 (GT) 1.07 (HM)	3.72 (GT) 0.70 (HM)	3.83 (GT) 0.69 (HM)	3.70 (GT) 0.80 (HM)	3.46 (GT) 0.66 (HM)	3.71 (GT) 0.74 (HM)
5. I can construct my thesis statements clearly.	3.82 (GT) 0.53 (HM)	3.71 (GT) 0.61 (HM)	3.61 (GT) 0.64 (HM)	3.72 (GT) 0.62 (HM)	3.35 (ST) 0.67 (HM)	3.38 (ST) 0.65 (HM)	3.60 (GT) 0.62 (HM)
6. I can organize my thoughts and ideas clearly and prepare a manuscript of my research.	3.88 (GT) 0.70 (HM)	3.64 (GT) 0.74 (HM)	3.81 (GT) 0.79 (HM)	3.83 (GT) 0.66 (HM)	3.70 (GT) 0.66 (HM)	3.54 (GT) 0.66 (HM)	3.73 (GT) 0.70 (HM)
7. I can construct my own conclusion based on the information gathered.	4.00 (GT) 0.87 (HM)	3.93 (GT) 1.00 (HM)	4.08 (GT) 0.55 (HM)	4.08 (GT) 0.75 (HM)	3.90 (GT) 0.79 (HM)	3.83 (GT) 0.64 (HM)	3.97 (GT) 0.77 (HM)
8. I can communicate orally the results of my research process.	3.71 (GT) 0.69 (HM)	3.86 (GT) 0.86 (HM)	3.89 (GT) 0.62 (HM)	3.96 (GT) 0.77 (HM)	3.80 (GT) 0.70 (HM)	3.54 (GT) 0.78 (HM)	3.79 (GT) 0.74 (HM)
9. I can constructively defend research outcomes.	3.82 (GT) 0.73 (HM)	3.64 (GT) 0.84 (HM)	4.00 (GT) 0.68 (HM)	3.88 (GT) 0.66 (HM)	3.80 (GT) 0.62 (HM)	3.67 (GT) 0.70 (HM)	3.80 (GT) 0.71 (HM)
10. I can formulate recommendations based on conclusions.	3.88 (GT) 0.78 (HM)	4.00 (GT) 0.96 (HM)	4.17 (GT) 0.61 (HM)	4.01 (GT) 0.71 (HM)	4.00 (GT) 0.65 (HM)	3.92 (GT) 0.72 (HM)	4.00 (GT) 0.74 (HM)
Overall	3.78 (GT) 0.69 (HM)	3.84 (GT) 0.87 (HM)	3.87 (GT) 0.66 (HM)	3.88 (GT) 0.55 (HM)	3.72 (GT) 0.71 (HM)	3.59 (GT) 0.69 (HM)	3.78 (GT) 0.70 (HM)

The analysis of respondents' research skills in statistical/quantitative analysis and evidence evaluation revealed several key findings across the six programs (BSNEd, BECEd, BEEd, BSEd, BPEd, and BTLEd). Students demonstrated strong capabilities in observing and collecting necessary data, with an overall mean of 4.05 (GT), classified as "Very Satisfactory." The BEEd students excelled in this skill, achieving a mean of 4.25 (CT), while BTLEd students scored the lowest with a mean of 3.75 (GT). Additionally, organizing and interpreting data using tables and graphs received high ratings, with an overall mean of 3.96 (GT). BEEd students again led with a mean of 4.19 (GT), reflecting their proficiency in data presentation and interpretation. These results are consistent with Vieno [3], who identified data analysis and communication as critical components of research skill development.

However, challenges emerged in areas such as determining appropriate statistical tools and performing statistical analyses using applications like SPSS or MS Excel. These skills recorded the lowest overall means of 3.61 (GT) and 3.54 (GT), respectively, indicating significant room for improvement. BTLEd students particularly struggled in these domains, scoring means of 3.33 (ST) and 3.42 (GT). These findings align with [4], who emphasized that gaps in methodological and technical research skills often hinder students' ability to process and analyze data effectively.

In terms of evaluating and organizing data systematically, the overall mean was 3.77 (GT), with BEEd students scoring the highest at 4.03 (GT). Similarly, concluding patterns and themes garnered an overall mean of 3.89 (GT), with BEEd students excelling once more at 4.17 (GT). The consistency of BEEd students' performance across various skills highlights their preparedness in statistical analysis and evidence evaluation, as echoed in the findings of Sumarwati et al. [8], which stressed the importance of inference and analysis skills in research. Conversely, BTLEd students lagged across most competencies, emphasizing the need for targeted interventions, such as hands-on workshops and enhanced mentorship programs, to address these skill gaps.

Overall, while students demonstrated "Very Satisfactory" performance in statistical/quantitative analysis and evidence evaluation, the results indicate variability across programs, with BEEd students consistently outperforming their peers. Addressing the specific weaknesses identified, particularly in the application of statistical tools and methods, is critical for fostering more comprehensive research competencies. Encouraging collaborative efforts, as suggested by Mydin et al. [9], could further enhance students' analytical skills by exposing them to diverse methodologies and peer support systems.

The study evaluated the research communication and language use skills of pre-service teachers across six programs at Negros Oriental State University. The findings revealed that the respondents' overall self-assessed competence in this domain was "Very Satisfactory" with an overall mean of 3.78 (SD = 0.70). Among the ten skill statements assessed, the highest-rated skill was "formulating recommendations based on conclusions" with an overall mean of 4.00, rated as "Very Satisfactory". This result aligns with previous findings by Vieno [3], who emphasized the importance of clear communication in synthesizing and articulating research insights. BEEd students excelled in this area with a mean of 4.17, showcasing their ability to summarize findings into actionable recommendations. Conversely, the lowest-rated skill was "constructing thesis statements clearly" with an overall mean of 3.60, a recurring challenge noted in studies such as that by Banu et al. [4], which highlighted difficulties in conceptualizing and organizing research ideas. BTLEd and BPEd students particularly struggled with this skill, with means of 3.38 and 3.35, respectively.

Across programs, BSEd and BEEd students performed best, with overall means of 3.88 and 3.87, respectively, reflecting strong communication abilities critical to research dissemination. BEEd students, in particular, showed competence in constructing conclusions (mean = 4.08) and defending research outcomes (mean = 4.00), reflecting their analytical and articulation skills. This supports the findings of Sumarwati et al. [8], who highlighted the significance of inference and communication skills in effectively conveying research outcomes. On the other hand, BTLEd students exhibited the lowest overall performance (mean = 3.59), particularly in constructing grammatically correct content (mean = 3.50) and using technical language (mean = 3.42). These results mirror the challenges in language use and communication observed in studies such as that by Campbell et al. [3], which emphasized the need for explicit instructional support in technical writing.

Despite these variations, the standard deviations across skills ranged from 0.55 to 1.07, indicating relative homogeneity in students' self-assessed competencies. However, consistent areas for improvement across programs include constructing thesis statements, organizing thoughts, and enhancing technical language proficiency. These gaps align with findings from Banu et al. [4] and Sumarwati et al. [8], which pointed out that inadequate guidance in research communication hinders students' ability to articulate their findings effectively.

To address these challenges, targeted interventions are recommended. Writing workshops focusing on thesis statement construction, grammar, and technical language use could improve students' academic writing skills. Additionally, mock defences and peer review sessions may help enhance oral communication skills and foster critical feedback, as suggested by Mydin et al. [9]. Tailored interventions for BTLEd students, who demonstrated lower competencies, could also bridge gaps in research communication and language use. Overall, the findings highlight the importance of equipping students with robust communication skills to meet academic and professional research demands, consistent with the need for skill development emphasized by Campbell et al. [3].

Table 3.1 Relationship Between the Respondents' Profile and Their Level of Research Skills in Terms of Problem Identification and Conceptualization

Problem Identification and Conceptualization	Relationship Value	Degree of Relationship
Age	0.008	No Relationship
Sex	0.060	Very Low Relationship
Program taken	0.0981	Very Low Relationship
Grades	0.118	Very Low Relationship
Correlation	**Relationship Value**	**Degree of Relationship**
Problem Identification and Conceptualization Skills vs. Program taken	0.0981	Very Low Relationship
Problem Identification and Conceptualization Skills vs. Grades	0.118	Very Low Relationship

Table 3.1 shows the relationship between respondents' demographic and academic profiles and their problem identification and conceptualization skills were analyzed using correlation analysis. Results revealed no significant relationship between age and problem identification and conceptualization skills, with a relationship value of 0.008, indicating no correlation. Similarly, the relationship between sex and these skills was found to be "very low" (relationship value = 0.060), suggesting minimal influence of gender on this competency. The program taken by respondents also exhibited a "very low" relationship (relationship value = 0.0981) with their ability to identify and conceptualize research problems, consistent with findings from studies such as those by Sumarwati et al. [8], which highlight that research competencies are relatively homogeneous across academic disciplines.

The correlation between problem identification and conceptualization skills and respondents' grades also demonstrated a "very low" relationship (relationship value = 0.118). This weak correlation suggests that academic performance does not significantly predict students' ability to conceptualize research problems. These findings align with research by Banu et al.[4], which found that academic grades alone do not fully reflect students' practical research skills, emphasizing the need for targeted skill development beyond academic achievement.

Overall, the very low to no relationships between demographic and academic variables and problem identification skills suggest that these competencies may be influenced more by instructional methods and opportunities for practice rather than individual characteristics. To enhance problem identification and conceptualization skills, tailored instructional strategies, such as active mentoring and problem-based learning activities, are recommended, consistent with the frameworks proposed by Vieno et al.[3].

Table 3.2 Relationship Between the Respondents' Profile and Their Level of Research Skills in Terms of Information and Evidence Seeking

Information and Evidence Seeking	Relationship Value	Degree of Relationship
Age	-0.060	Very Low Relationship
Sex	0.002	No Relationship

Program taken	0.075	Very Low Relationship
Grades	0.065	Very Low Relationship

Correlation	Spearman	Degree of Relationship
Information and Evidence Seeking Skills vs Program taken	0.075	Very Low Relationship
Information and Evidence Seeking Skills vs Grades	0.065	Very Low Relationship

Table 3.2 presents the relationship between respondents' profiles and their level of research skills in information and evidence seeking was also examined using correlation analysis. Results indicated a "very low" negative relationship between age and information and evidence-seeking skills, with a relationship value of -0.060. This suggests that age does not significantly influence the development of these skills. Similarly, there was no measurable relationship between sex and information and evidence-seeking skills, as shown by a relationship value of 0.002. These findings align with studies such as Banu et al. [4], which emphasize that demographic factors like age and sex have minimal impact on core research skills.

The program taken by respondents showed a "very low" relationship with information and evidence-seeking skills (relationship value = 0.075), indicating that students' academic programs do not strongly affect their capacity to seek and utilize evidence in research. Additionally, the correlation between grades and these skills also demonstrated a "very low" relationship (relationship value = 0.065), which is consistent with previous findings that academic performance alone is not a reliable predictor of research competencies [8].

These results suggest that the development of information and evidence-seeking skills depends less on demographic or academic profiles and more on educational strategies and resources provided during instruction. To address gaps in these skills, as highlighted by Fareed et al. [5], educators should emphasize hands-on practice with evidence-seeking tools and foster critical appraisal skills through structured activities. This aligns with the recommendations of Vieno et al. [3], which stress the importance of integrating technical and transferable skills into research instruction.

Table 3.3 Relationship Between the Respondents' Profile and Their Level of Research Skills in Terms of Research Methodology

Research Methodology	Relationship Value	Degree of Relationship
Age	-0.022	Very Low Relationship
Sex	0.047	Very Low Relationship
Program taken	0.116	Very Low Relationship
Grades	0.167	Very Low Relationship

Correlation	Spearman	Degree of Relationship
Research Methodology Skills Program taken	0.116	Very Low Relationship
Research Methodology Skills Grades	0.167	Very Low Relationship

Table 3.3 shows the relationship between respondents' profiles and their level of research skills in terms of research methodology was analyzed, and the results revealed "very low" correlations across all variables. Age showed a negative relationship value of -0.022, indicating no meaningful connection between a respondent's age and their proficiency in research methodology skills. Similarly, the relationship between sex and research methodology skills was minimal, with a relationship value of 0.047. These findings are consistent with studies like Sumarwati et al. [8], which found that demographic factors such as age and sex do not significantly affect research skill acquisition.

The program taken by respondents demonstrated a "very low" positive relationship (relationship value = 0.116) with research methodology skills. This suggests that while academic programs may provide foundational knowledge, their influence on students' research methodology competencies remains limited. Similarly, grades showed a "very low" relationship (relationship value = 0.167), indicating that academic performance has minimal predictive power regarding students' research methodological capabilities. These results align with Banu et al. [4], who found that methodological gaps are often attributable to instructional inefficiencies rather than students' profiles.

Overall, the findings suggest that developing research methodology skills requires more targeted interventions beyond reliance on general academic performance or demographic factors. As highlighted by Vieno et al. [3], incorporating structured opportunities for hands-on learning and addressing specific methodological challenges can better equip students with essential research skills. Tailored support and practical training could address gaps in understanding research designs, formulating frameworks, and ethical considerations[9].

Table 3.4 Relationship Between the Respondents' Profile and Their Level of Research Skills in Terms of Statistical/Quantitative Analysis and Evidence Evaluation

Statistical/Quantitative Analysis and Evidence Evaluation	Relationship Value	Degree of Relationship
Age	-0.129	Very Low Relationship
Sex	0.101	Very Low Relationship
Program taken	0.089	Very Low Relationship
Grades	0.058	Very Low Relationship

Correlation	Spearman	Degree of Relationship
Statistical/Quantitative Analysis and Evidence Evaluation Skills vs Program Taken	0.089	Very Low Relationship
Statistical/Quantitative Analysis and Evidence Evaluation Skills vs Grades	0.058	Very Low Relationship

The analysis of the relationship between respondents' profiles and their level of research skills in terms of statistical/quantitative analysis and evidence evaluation revealed very low correlations across all demographic factors. Age had a negative relationship value of -0.129,

indicating no meaningful relationship between age and proficiency in statistical or quantitative analysis skills. This result aligns with previous findings, such as those from Banu et al. [4], who noted that age did not significantly influence students' research capabilities in statistical analysis.

Similarly, sex showed a very low positive relationship (relationship value = 0.101), suggesting no substantial impact of gender on the acquisition of statistical analysis skills. The program taken by respondents also demonstrated a very low positive relationship (relationship value = 0.089), meaning the type of academic program had little influence on students' abilities in this area. These findings reflect the views of Vieno et al. [3], who suggested that curricula need to offer more explicit opportunities for developing technical skills, particularly in data analysis, regardless of the student's program of study.

Grades showed a very low relationship value of 0.058, reinforcing the idea that academic performance alone is not a strong predictor of students' abilities in statistical analysis and evidence evaluation. This aligns with the work of Mydin et al. [9], which emphasized the need for targeted support in enhancing students' research skills, especially in quantitative areas.

Overall, the results underscore that statistical and quantitative research skills are not strongly influenced by demographic factors or general academic performance. As such, improving students' competencies in this area may require more specialized training and opportunities for hands-on experience, as well as a focus on methodological application rather than solely relying on grades or program types [5].

Table 3.5 Relationship Between the Respondents' Profile and Their Level of Research Skills in Terms of Communication and Language Use Table

Communication and Language Use	Relationship Value	Degree of Relationship
Age	-0.033	Very Low Relationship
Sex	0.088	Very Low Relationship
Program taken	0.143	Very Low Relationship
Grades	0.160	Very Low Relationship

Correlation	Spearman	Degree of Relationship
Communication and Language Use vs Program taken	0.143	Very Low Relationship
Communication and Language Use vs Grades	0.160	Very Low Relationship

The relationship between the respondents' profiles and their level of research skills in terms of communication and language use indicated very low correlations across all demographic factors. Age exhibited a negative relationship value of -0.033, signifying a negligible relationship between age and communication skills in research. This finding is consistent with the notion that factors such as age may not significantly impact students' ability to effectively communicate research, as seen in similar studies like that of Banu et al. [4], which emphasized other determinants of research skills development.

Sex demonstrated a very low positive relationship value of 0.088, suggesting that gender has little to no effect on

research communication abilities. Likewise, the program taken showed a very low positive relationship value of 0.143, which indicates that the type of program does not significantly influence the communication skills needed for effective research. These results support the findings of Mydin et al. [9], who found that regardless of academic discipline, students faced challenges in honing their communication skills, which are crucial for presenting research outcomes clearly.

Grades also showed a very low positive relationship (0.160), indicating that academic performance has a minimal impact on students' language use and communication skills in research contexts. This is in line with Vieno et al. [3], who identified that research communication skills need to be cultivated through more deliberate instructional strategies, rather than being solely tied to academic success or other demographic variables.

In conclusion, the analysis of communication and language use in research reveals that factors such as age, sex, program taken, and grades have negligible relationships with students' research communication skills. These findings suggest the need for focused interventions to enhance students' ability to present and communicate research effectively, regardless of these background characteristics [5].

Challenges Experienced by the Student-Teacher Respondents in Terms of Problem Identification and Conceptualization Skills, Information and Evidence Seeking Skills, Research Methodology Skills, Statistical/Quantitative Analysis and Evidence Evaluation Skills, and Communication and Language Skills

Problem Identification and Conceptualization: Students across programs struggle to define precise research problems, formulate hypotheses, and connect research questions effectively to their topics. This difficulty is amplified when instructors lack expertise in students' specific fields, making it harder for students to develop relevant, targeted research questions.

Information and Evidence Gathering: Students often face challenges in finding credible sources, especially recent and specialized literature. Many also struggle with assessing the reliability of sources and organizing gathered information systematically, with limited time for in-depth research.

Research Methodology: Across programs, students encounter difficulties in selecting suitable research designs, frameworks, and ethical considerations. Some students feel unprepared due to limited instruction on applying methodological principles relevant to their specific fields of study.

Statistical and Quantitative Analysis: Many students lack proficiency with statistical tools like SPSS and Excel, making data analysis and interpretation challenging. Limited access to these tools, combined with insufficient training, hinders students' confidence in applying statistical methods to their research.

Communication and Language Skills: Students find it challenging to articulate their research findings clearly, whether in writing or oral presentations. Many struggles with technical language, grammatical accuracy, and conveying complex results effectively, especially during defences.

Suggestions to Improve Research Instruction

Enhanced Technology and Tools: Students recommended integrating the latest technology, including comprehensive training on statistical software like SPSS, to aid data analysis and interpretation.

Workshops and Hands-On Learning: Frequent workshops, seminars, and hands-on sessions are suggested to provide in-depth guidance on all research stages, from methodology to data analysis. Field-specific workshops would particularly benefit students whose research areas are niche.

Field-Aligned Instructor Expertise: There is a strong call for instructors who are experts in students' areas of specialization, as this would allow for more relevant guidance, especially in niche fields like Physical Education and Early Childhood Education.

Detailed, Step-by-Step Instruction: Students desire a more structured approach to research instruction, with standardized guidelines for each part of the research process, allowing for consistency in expectations and feedback.

Supportive and Approachable Faculty: A supportive and approachable instructional style, with open lines of communication for questions and feedback, would help students overcome common research hurdles.

Increased Time for Research Mastery: Allocating more time within the curriculum for research activities and individual student support can help students strengthen their understanding and application of complex research skills.

CONCLUSIONS

This study investigated the research skills of senior pre-service teachers at Negros Oriental State University (NORSU) in various dimensions, including problem identification and conceptualization, information and evidence seeking, research methodology, statistical/quantitative analysis and evidence evaluation, and communication and language use. The findings provided valuable insights into the current state of research skill development among pre-service teachers, highlighting both strengths and areas for improvement.

Overall, the results indicated that the students demonstrated a very satisfactory level of proficiency in their research skills, with means ranging from 3.59 to 3.88 across different dimensions. Among the skills assessed, students excelled in areas such as formulating recommendations based on conclusions, constructing their own conclusions, and preparing grammatically and syntactically correct content for presentations. These strengths align with prior research, such as that of Banu et al. [4], which identified that students are more adept at communicating research outcomes when they have a structured learning experience.

However, several areas for improvement emerged. Students reported lower levels of competence in problem identification and conceptualization, particularly in the formulation of research hypotheses and the organization of research ideas. This finding supports the work of Fareed et al. [5], who observed challenges in generating research topics and formulating coherent research questions among students. Additionally, statistical/quantitative analysis was identified as a weaker area, where students struggled with performing statistical analysis using tools like SPSS and Excel. These findings are consistent with the concerns raised by Banu et al. [4] regarding the gap in

methodological and analytical skills among undergraduate students.

The correlation analysis revealed that demographic factors, such as age, sex, program taken, and grades, exhibited very low relationships with students' research skills across all dimensions. These findings suggest that students' research capabilities are more influenced by the quality of instruction and exposure to research-related tasks rather than by demographic variables. This finding echoes the conclusions of Mydin et al. [9], who highlighted the importance of creating a supportive research culture and providing tailored instructional interventions to improve research skills.

In light of these findings, it is clear that while senior pre-service teachers at NORSU demonstrate satisfactory research skills in some areas, significant gaps remain, particularly in conceptualizing research problems and performing statistical analyses. These results suggest that further curriculum development and instructional strategies should focus on enhancing students' foundational research skills, particularly in areas of problem formulation and quantitative analysis. Tailored workshops, more hands-on experience with data analysis tools, and a deeper focus on research methodology could bridge these gaps and better prepare students for their future roles as educators and researchers.

Finally, the study emphasizes the importance of providing explicit opportunities for students to develop their research skills in both thesis and non-thesis tracks, in alignment with recommendations from Vieno et al. [3]. By addressing the identified challenges and fostering a more research-oriented learning environment, universities can improve the overall research competency of pre-service teachers, thereby contributing to their professional development and the advancement of educational research.

RECOMMENDATIONS

Based on the findings of this study, several recommendations are proposed to improve the research skills of senior pre-service teachers at Negros Oriental State University (NORSU) and similar institutions. First, there is a need to strengthen problem identification and conceptualization skills, as students showed challenges in formulating research questions and hypotheses. To address this, faculty members could integrate more interactive exercises in early-stage research courses, such as workshops focused on research title writing and hypothesis formulation. Additionally, mentorship programs should be established where faculty guide students through the process of topic selection and refinement.

Another key area for improvement is statistical and quantitative analysis skills, as students struggled with using tools like SPSS and Excel for data analysis. To address this, more hands-on training and practical sessions should be incorporated into research methodology courses. Specialized workshops on statistical software could also help students improve their ability to apply these tools effectively. Peer-led study groups could further reinforce learning by encouraging collaborative practice in quantitative analysis.

Curriculum and instructional reforms are also crucial. The study suggests that students' research skills are more dependent on instructional quality than demographic factors. Therefore, a review of the research curriculum is

recommended to ensure that each course builds progressively on research competencies. Faculty should also receive ongoing professional development to stay current with research methods and teaching practices. Active learning strategies, such as project-based learning, could be introduced to help students apply theoretical knowledge to real-world research scenarios.

To foster a collaborative research culture, cross-program collaboration among students from different disciplines should be encouraged. This could be facilitated by research groups or joint projects that allow students to share ideas and improve their communication and language use in research. Furthermore, increasing exposure to global research databases, like Scopus and Web of Science, would help students strengthen their information-seeking skills. Training sessions on accessing and using academic databases should be organized, and students should be encouraged to present their research at academic conferences to engage with a wider research community.

Metacognitive training and self-reflection are essential for developing independent research skills. Incorporating reflective exercises and self-regulation strategies into the curriculum would allow students to assess their progress and adjust their approach to research. Continuous feedback from both peers and faculty would support this process and help students refine their research practices.

Lastly, support should be tailored to the specific needs of different academic programs. Programs with lower research scores, such as BTLEd, may benefit from additional resources and workshops. Peer mentoring, where students from higher-scoring programs like BSEd guide their peers, could also help bridge the gap in research skills. Promoting ethical research practices is equally important, and discussions on ethics, plagiarism prevention, and data management should be integrated into the curriculum to ensure that students understand their ethical responsibilities as researchers.

By implementing these recommendations, NORSU can enhance the research competencies of its senior pre-service teachers, ensuring that they are better prepared for their academic and professional careers in education. These improvements would not only benefit the students but also contribute to creating a stronger, more research-oriented teaching culture at the university.

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