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UNDERSTANDING RESEARCH METHODOLOGY AND STATISTICS: INSIGHTS FROM PRE-PH.D. COURSEWORK STUDENTS

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Abstract

The study mainly aims to explore the understanding of research methodology and statistics of the coursework students and how coursework would help them in their understanding of advanced statistics and methodology. Using a case study design, the researcher selected only one institution with a sample of 17 pre-Ph.D. student purposively. For collecting data, the researcher used a self-developed semi-structured interview schedule and analyzed the data through thematic analysis. The findings revealed that most of the students possessed a basic to moderate level understanding of research methodology and statistics before joining the coursework, and after joining the coursework, they enhanced their knowledge, confidence, and research competence. However, challenges related to advanced statistical techniques, data analysis, statistical software, and the practical application of research methods persisted.

Keywords: Research methodology, statistics, research competence

Introduction

For conducting research, knowledge of methodology and statistics is crucial. Methodology is considered the heart of the research process as it provides the framework for designing and conducting a study. These two components comprised the main part of the research, i.e., the selection of the research design, sampling, development of tools & techniques and the overall procedure of data collection and analysis. Knowledge and competency in these two boost the quality of research (Wang et al., 2024). Generally, research demands knowledge in basic as well as advanced statistics and methods. Master's and Ph.D. students had a different level of attitude and knowledge towards statistics (Yusof et al. 2021; Dowall & Ramos, 2024). Students perceive statistics as a difficult subject and often encounter problems in data analysis, although they have a strong theoretical understanding of the

concept. Learning research methods should be about more than just absorbing theory; it should develop inquiry, critical thinking, and real-world research abilities (Freitas, 2023).

Methodological training like pre-Ph.D. coursework helps scholars become more confident in planning the proposal, designing their studies, collecting and analysing data and sharing results etc. (Haughton, 2023). Some scholars show keen interest in quantitative research, while others prefer qualitative but integrating both types of design is tough for students. Fear of statistics also hampers their involvement in research, and they often struggle in interpreting results and applying more sophisticated statistical techniques (Lukman et al., 2022; Catanzaro, 2023). Doctoral students need to develop the ability to formulate meaningful research questions and select appropriate methodological approaches for investigating a research problem that is challenging and requires continuous guidance and training in doctoral studies (Girard et al., 2025). In Ph.D. coursework, research methodology and statistics play a crucial role in developing students' research knowledge, skills, and competency (Philip, 2024). Although there are several studies on the importance of research methodology and statistics in research, there is a limited number of studies on how coursework or such types of training help in developing the scholars' knowledge and competency in research, which strengthens their quality of research work.

Objectives of the Study

1. To explore the understanding of pre-Ph.D. coursework students on research methodology and statistics before the coursework.
2. To examine the contribution of pre-Ph.D. coursework to the development of research methodological and statistical competence among students.
3. To study the challenges experienced by pre-Ph.D. coursework students while learning research methodology and statistics.

Research Questions

1. How do pre-Ph.D. coursework students describe their understanding of research methodology and statistics before coursework?
2. How do pre-Ph.D. coursework students describe the contribution of coursework to their development of research methodological and statistical competence?
3. What challenges do pre-Ph.D. coursework students experience while learning research methodology and statistics?

Methodology

Taking the nature of this study, a case study design of qualitative research was employed to collect in-depth data on their understanding and knowledge about research methodology and statistics of pre-Ph.D. coursework students

Population and Sample

For the present study, the sample is equivalent to the population. Purposive sampling was employed for the study. One institute with 17 pre-Ph.D. students were purposively selected to collect data with a mix of science and social science backgrounds.

Tools and Techniques

A self-developed semi-structured interview schedule comprised of ten open-ended items was used to collect data from the participant. The qualitative data obtained through the interviews were analysed using thematic analysis

Analysis & Interpretation

Objective-1: To explore the understanding of pre-PhD. coursework students on research methodology and statistics before the coursework:

Most of the students joined the course with a basic to moderate level understanding of research methodology and statistics. They generally possessed basic theoretical knowledge during their postgraduate studies. Some scholars are familiar with quantitative, qualitative and mixed methods, along with their respective designs. A few students knew advanced, sophisticated statistical techniques, such as MANOVA, MANCOVA and the Mann-Whitney U test. However, most students were familiar with basic statistical techniques, including the t-test, z-test, ANOVA, ANCOVA and the Chi-square test. Some students were facing difficulties in understanding concepts related to hypothesis testing, such as the level of significance (95% & 99%) and one-tailed & two- tailed test. Some also experienced challenges in interpreting statistical results. Although many students were able to analyse data using statistical software such as SPSS, they often faced difficulties in accurately interpreting and reporting the findings.

Objective-2. To examine the contribution of Pre Ph.D. coursework to the development of research methodological and statistical competence among students:

From the participants' perspectives, the pre-Ph.D. coursework contributed significantly to enhancing students' understanding of research methodology and statistics. A noticeable improvement has been observed in their knowledge of research design, tool development and data analysis techniques after joining the group. Participant stated that before the coursework, they primarily focused on the computational aspects of statistical analysis. But through the course, they developed a deeper understanding of the assumptions underlying various statistical tests, their appropriate applications and the contexts they should be used. They also gained proficiency in using multiple software packages for data analysis, including SPSS and JAMOVI for quantitative analysis and QDA Miner & NVivo for qualitative analysis. This coursework also provides valuable exposure for academic writing, manuscript preparation, identification of a suitable journal for publication and research ethics. This experience helped them in strengthening their overall research competency and preparedness for conducting independent scholarly research.

Objective- 3. To study the challenges experienced by pre-Ph.D. coursework students while learning research methodology and statistics:

Participant reported that due to a lack of time, some topics such as MANCOVA, regression analysis and other multivariate techniques could not be covered in depth during coursework time. As a result, many students felt less confident in these areas of statistics. They also face challenges related to academic reading and writing. Synthesizing information from multiple sources and adhering to academic writing conventions and referencing styles were perceived as difficult tasks. Sometimes, unfamiliar research terminology, technical language and complex methodological descriptions often hindered their comprehension of literature.

Conclusion

Training sessions like pre-Ph.D. coursework played a crucial role in increasing the quality of the research and research competency. Although there are several advantages students take from the coursework, they still face problems related to advanced statistical techniques, the application of research methods, the use of statistical software, and access to learning resources. The study highlights the importance of pre-Ph.D. coursework in strengthening research preparedness while emphasizing the need for continued practical training and support in research methodology and statistics.

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