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Assessment of knowledge of primary research among post-graduate student-teachers

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Abstract

Primary research gives us first-hand knowledge and new ways of thinking about a subject or question, and it is an important part of both academic and scientific inquiry. It means getting information from experiments, surveys, interviews, observations, and other ways of gathering information. This kind of study is necessary to find out novel ideas, test hypotheses, and prove that theories are correct. This study investigates the knowledge of primary research among post-graduate student-teachers. The study has been conducted on a representative sample of 100 post-graduate student-teachers. A questionnaire developed and validated by the researcher has been used to collect the data. The statistical techniques t-test, two-way ANOVA, and Tukey's multiple posthoc procedures were used for the analysis. The study found significant differences between post-graduate education (M.Ed.) and physical education (M.P.Ed.), male and female student-teachers with knowledge scores towards conducting primary research.

Keywords: Assessment; Research knowledge; Student; Teachers

1. Introduction

Assessment of post-graduate student-teachers knowledge in conducting primary research is essential for evaluating their ability to engage in scholarly inquiry, contribute to advancing knowledge in their respective fields, and ultimately enhance their effectiveness as educators. Primary research, which involves collecting and analyzing original data, is a cornerstone of academic and professional development for post-graduate student-teachers, providing them with valuable skills for critically evaluating existing literature, generating new insights, and informing evidence-based practice in education.

Assessing post-graduate student-teachers' knowledge in primary research involves evaluating their proficiency in various areas, including research design, data collection methods, data analysis techniques, ethical considerations, and the ability to effectively communicate research findings. This comprehensive assessment ensures that student-teachers understand the theoretical foundations of research methodology and possess the practical skills necessary to conduct rigorous and meaningful research in educational contexts.

Objectives of the Study

- To assess the knowledge of post-graduate student-teachers in conducting primary research.
- To compare the knowledge of post-graduate male and female student-teachers in conducting primary research.
- To compare the knowledge of post-graduate education (M.Ed.) and physical education (M.P.Ed.) student-teachers in conducting primary research.

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- To study the interaction effect of gender (male and female) and streams (education and physical education) of post-graduate student-teachers on knowledge scores towards conducting primary research.

1.1. Hypotheses of the Study

- There is no significant relationship between the knowledge of post-graduate male and female student-teachers in conducting primary research.
- There is no significant relationship between the knowledge of post-graduate education (M.Ed.) and physical education (M.P.Ed.) student-teachers in conducting primary research.
- There is no significant interaction effect of gender (male and female) and streams (education and physical education) of post-graduate student-teachers on knowledge scores towards conducting primary research.

1.2. Sample of the Study

The study has been conducted on a representative sample of 100 post-graduate student-teachers studying second year M.Ed. and M.P.Ed. The sample has been selected by using simple random sampling.

1.3. Tool Used for Data Collection

The researcher developed and validated a questionnaire based on the aspects of research methodology to assess the knowledge of post-graduate student-teachers in conducting primary research.

2. Results

2.1. Null hypothesis 1

There is no significant difference between post-graduate education (M.Ed.) and physical education (M.P.Ed.) student-teachers with knowledge scores towards conducting primary research.

To test this null hypothesis, the independent t-test was applied and the results are presented in the following table.

Table 1 Comparison of post-graduate education (M.Ed.) and physical education (M.P.Ed.) student-teachers with knowledge scores towards conducting primary research

Students	n	Mean	SD	SE	t-value	P-value
Post-graduate education	47	107.87	6.96	1.01	5.4666	0.0001, S
Post-graduate physical education	53	99.70	7.89	1.08		

From the results of the above table, it can be seen that a significant difference was observed between post-graduate education (M.Ed.) and physical education (M.P.Ed.) student-teachers with knowledge scores towards conducting primary research ($t=5.4666$, $p=0.0001$) at 5% level of significance. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted. It means that, the mean knowledge scores are significantly higher in post-graduate education (M.Ed.) student-teachers (107.87 ± 6.96) as compared to post-graduate physical education (M.P.Ed.) student-teachers (99.70 ± 7.89). The mean scores are also presented in the following figure.

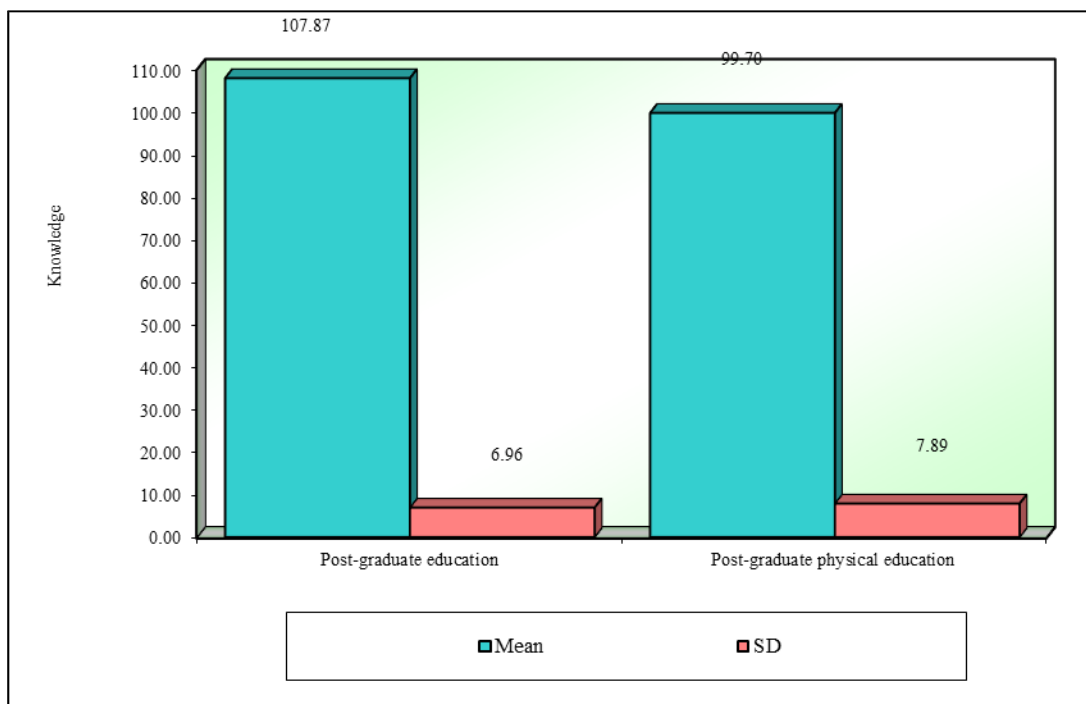


Figure 1 Comparison of post-graduate education (M.Ed.) and physical education (M.P.Ed.) student-teachers with knowledge scores towards conducting primary research

2.2. Null hypothesis 2

There is no significant difference between male and female post-graduate student-teachers with knowledge scores towards conducting primary research.

To test this null hypothesis, the independent t-test was applied and the results are presented in the following table.

Table 2 Comparison of male and female post-graduate student-teachers with knowledge scores towards conducting primary research

Gender	n	Mean	SD	SE	t-value	P-value
Male	41	99.54	8.60	1.34	-4.2619	0.0001, S
Female	59	106.32	7.25	0.94		

From the results of the above table, it can be seen that a significant difference was observed between male and female post-graduate student-teachers with knowledge scores towards conducting primary research ($t=-4.2619$, $p=0.0001$) at a 5% level of significance. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted. The mean knowledge scores are significantly higher in female post-graduate student-teachers (106.32 ± 7.25) compared to male post-graduate student-teachers (99.54 ± 8.60). The mean scores are also presented in the following figure.

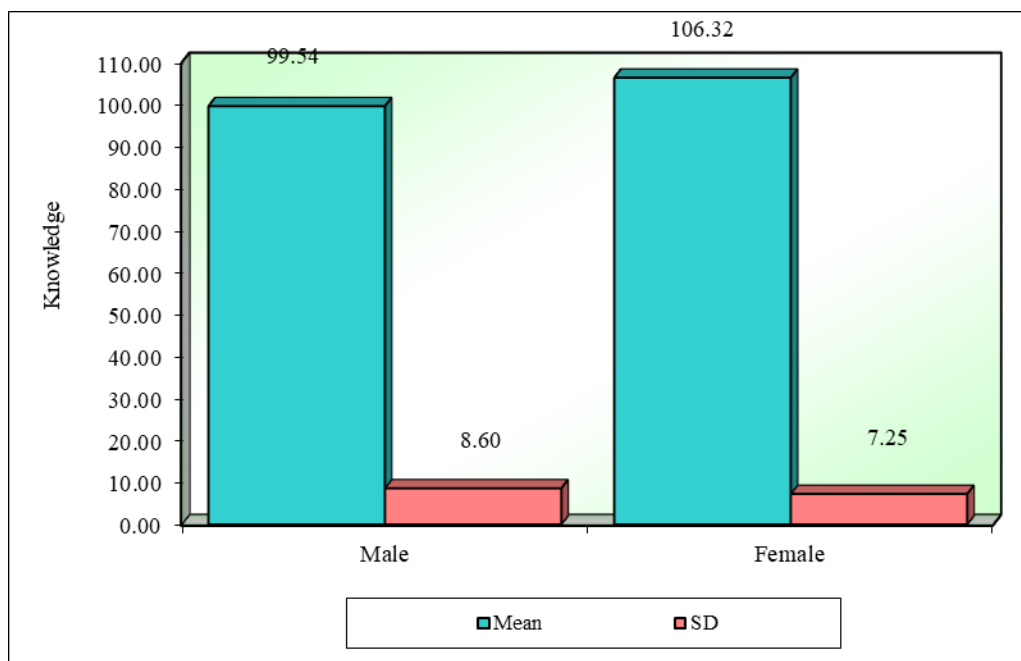


Figure 2 Comparison of male and female post-graduate student-teachers with knowledge scores towards conducting primary research

2.3. Null hypothesis 3

There is no significant interaction effect of gender (male and female) and streams (education and physical education) of post-graduate student-teachers on knowledge scores towards conducting primary research.

To test the above null hypothesis, the two-way ANOVA with interaction design was performed, and the outcome of the test was highlighted in the following table.

Table 3 Results of two-way ANOVA with interaction effect of gender (male and female) and streams (education and physical education) of post-graduate student-teachers on knowledge scores towards conducting primary research

Sources of variation	Sum of squares	Degrees of freedom	Mean sum of squares	F-value	p-value
Main effects					
Gender	1332.8429	1	1332.8429	27.3650	0.0001,S
Streams	643.7866	1	643.7866	13.2178	0.0004,S
2-way interaction effects					
Gender * Streams	70.6167	1	70.6167	1.4499	0.2315,NS
Error	4675.7946	96	48.7062		
Total	6723.0408	99			

From the results, it can be seen that,

- For the main effect of gender (male and female) of post-graduate student-teachers on knowledge scores towards conducting primary research, the F calculated value is 27.3650, and the F critical value with 1 and 96 degrees of freedom is 3.9200. It clearly shows that the calculated value of F is greater than the critical value of F i.e., $27.3650 > 3.9200$. This means that a significant difference was observed between male and female post-graduate student-teachers with respect to knowledge scores when conducting primary research. Hence, the null hypothesis is rejected and alternative hypothesis is accepted. In another word, the knowledge scores towards conducting primary research are different in male and female post-graduate student-teachers.

- For the main effect of streams (education and physical education) of post-graduate student-teachers on knowledge scores towards conducting primary research, the F calculated value is 13.2178, and the F critical value with 1 and 96 degrees of freedom is 3.9200. It clearly shows that the calculated value of F is greater than the critical value of F i.e., $13.2178 > 3.9200$. This means that a significant difference was observed between education and the physical education stream of post-graduate student-teachers with respect to knowledge scores when conducting primary research. Hence, the null hypothesis is rejected, and the alternative hypothesis is accepted. In other words, the knowledge scores towards conducting primary research differ in education and physical education streams post-graduate student-teachers.
- For the interaction effect of gender (male and female) and streams (education and physical education) of post-graduate student-teachers on knowledge scores towards conducting primary research, the F calculated value is 1.4499 and the F critical value with 1 and 96 degrees of freedom is 3.9200. It clearly shows that the calculated value of F is higher than the table value of F. It clearly shows that the calculated value of F is greater than the critical value of F i.e. $1.4499 < 3.9200$. Therefore, the null hypothesis is accepted, and the alternative hypothesis is rejected. It means that the knowledge scores towards conducting primary research are similar in male and female of education and physical education stream post-graduate student-teachers.

Further, to know the pair-wise comparisons of the interaction effect of gender (male and female) and streams (education and physical education) of post-graduate student-teachers on knowledge scores towards conducting primary research by applying the Tukey's multiple posthoc procedures and the results are presented in the following table.

Table 4 Pair-wise comparisons of the interaction effect of gender (male and female) and streams (education and physical education) on knowledge scores towards conducting primary research by Tukey's multiple posthoc procedures.

Interactions	Female with education stream	Male with education stream	Female with physical education stream	Male with physical education stream
Mean	109.00	105.47	103.15	96.12
SD	7.70	4.29	5.22	8.65
Female with education stream	-			
Male with education stream	P=0.3736,NS	-		
Female with physical education stream	P=0.0097,S	P=0.7314,S	-	
Male with physical education stream	P=0.0001,S	P=0.0006,S	P=0.0023,S	-

The results of the above table clearly show that,

- The female post-graduate student-teachers with education stream and male post-graduate student-teachers with education stream do not differ significantly regarding knowledge scores towards conducting primary research at 5% significance level. This means female post-graduate student-teachers with an education stream and male post-graduate student-teachers have similar knowledge scores when conducting primary research.
- The female post-graduate student-teachers with education stream and female post-graduate student-teachers with physical education stream differ significantly regarding knowledge scores towards conducting primary research at 5% significance level. This means that female post-graduate student-teachers in the education stream have significantly higher knowledge scores in conducting primary research than those in the physical education stream.
- The female post-graduate student-teachers with education stream and male post-graduate student-teachers with physical education stream differ significantly regarding knowledge scores towards conducting primary research at 5% significance level. It means that the female post-graduate student-teachers in education stream have significant and higher knowledge scores towards conducting primary research than male post-graduate student-teachers in physical education stream.
- The male post-graduate student-teachers with education stream and female post-graduate student-teachers with education stream do not differ significantly regarding knowledge scores towards conducting primary

research at 5% significance level. This means that male post-graduate student-teachers with an education stream and female post-graduate student-teachers with an education stream have similar knowledge scores when conducting primary research.

- The male post-graduate student-teachers with education stream and male post-graduate student-teachers with physical education stream differ significantly regarding knowledge scores towards conducting primary research at 5% significance level. It means that the male post-graduate student-teachers in education stream have significant and higher knowledge scores towards conducting primary research than male post-graduate student-teachers in physical education stream.
- The female post-graduate student-teachers with physical education stream and male post-graduate student-teachers with physical education stream differ significantly regarding knowledge scores towards conducting primary research at 5% significance level. It means that, the female post-graduate student-teachers with physical education stream have significant and higher knowledge scores towards conducting primary research than male post-graduate student-teachers with physical education stream. The mean and SD are also presented in the following figure.

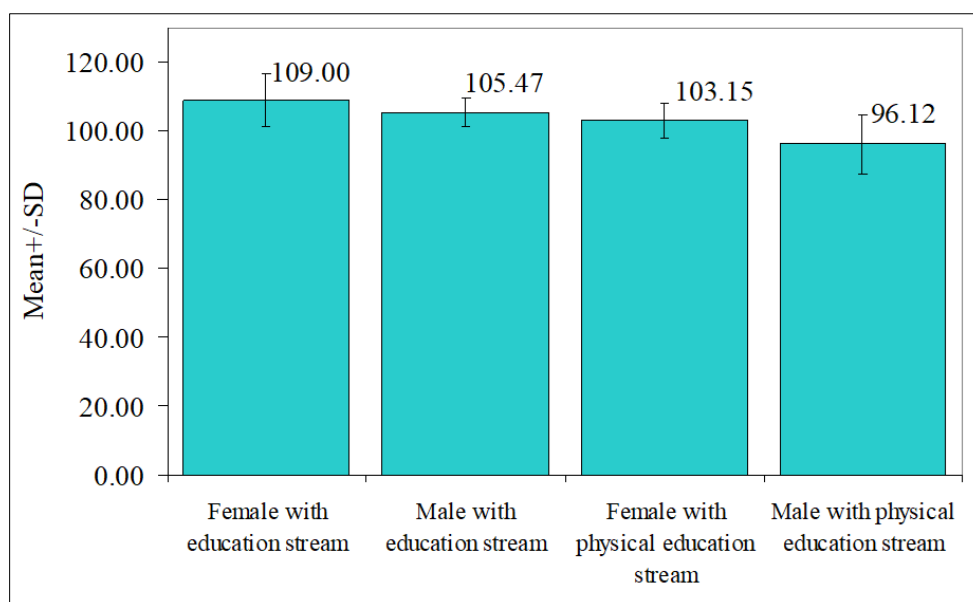


Figure 3 Comparisons of interaction effect of gender (male and female) and streams (education and physical education) on knowledge scores towards conducting primary research

3. Findings

- A significant difference was observed between post-graduate education (M.Ed.) and physical education (M.P.Ed.) student-teachers with knowledge scores towards conducting primary research.
- A significant difference was observed between male and female post-graduate student-teachers with knowledge scores towards conducting primary research.
- The interaction effect of gender (male and female) and streams (education and physical education) of post-graduate student-teachers is found to be statistically significant on knowledge scores towards conducting primary research.
- The female post-graduate student-teachers with education stream and male post-graduate student-teachers with education stream do not differ significantly with respect to knowledge scores towards conducting primary research.
- The female post-graduate student-teachers with education stream and female post-graduate student-teachers with physical education stream differ significantly with respect to knowledge scores towards conducting primary research.
- The female post-graduate student-teachers with education stream and male post-graduate student-teachers with physical education stream differ significantly with respect to knowledge scores towards conducting primary research.

- The male post-graduate student-teachers with education stream and female post-graduate student-teachers with education stream do not differ significantly with respect to knowledge scores towards conducting primary research.
- The male post-graduate student-teachers with education stream and male post-graduate student-teachers with physical education stream differ significantly with respect to knowledge scores towards conducting primary research.
- The female post-graduate student-teachers with physical education stream and male post-graduate student-teachers with physical education stream differ significantly with respect to knowledge scores towards conducting primary research.

4. Conclusion

- The mean knowledge scores are significantly higher in post-graduate education (M.Ed.) student-teachers (107.87 ± 6.96) as compared to post-graduate physical education (M.P.Ed.) student-teachers (99.70 ± 7.89).
- The mean knowledge scores are significantly higher in female post-graduate student-teachers (106.32 ± 7.25) as compared to male post-graduate student-teachers (99.54 ± 8.60).
- The knowledge scores towards conducting primary research are similar in male and female of education and physical education stream post-graduate student-teachers.
- The female post-graduate student-teachers with education streams and male post-graduate student-teachers have similar knowledge scores when conducting primary research.
- The female post-graduate student-teachers with an education stream have significantly higher knowledge scores in conducting primary research than those with a physical education stream.
- The female post-graduate student-teachers with an education stream have significantly higher knowledge scores in conducting primary research compared to male post-graduate student-teachers with a physical education stream.
- The male post-graduate student-teachers with education stream and female post-graduate student-teachers with education stream have similar knowledge scores towards conducting primary research.
- The male post-graduate student-teachers with an education stream have significantly higher knowledge scores in conducting primary research compared to male post-graduate student-teachers with a physical education stream.
- The female post-graduate student-teachers with physical education stream have significant and higher knowledge scores towards conducting primary research as compared to male post-graduate student-teachers with physical education stream.

Educational Implications

Assessing post-graduate student-teachers' ability to conduct primary research holds significant educational implications. Here are some key points to consider:

- Assessment of knowledge in conducting primary research requires a deep understanding of various research methods such as qualitative, quantitative, and mixed methods. Student-teachers should demonstrate their knowledge of these methods and their appropriateness in different research contexts.
- Student-teachers need to comprehend the intricacies of research design, including defining research questions and selecting appropriate methodologies, sampling techniques, data collection methods, and ethical considerations. Assessments should evaluate their ability to design robust research studies.
- Effective literature review is crucial for informing research design and providing context for the study. Student-teachers should demonstrate their ability to critically analyze existing literature, identify gaps, and justify the significance of their research questions.
- Assessments should evaluate student-teachers' proficiency in selecting and applying suitable data collection techniques such as surveys, interviews, observations, or experiments. They should demonstrate an understanding of each method's strengths, limitations, and ethical considerations.
- Student-teachers must demonstrate competence in data analysis, including quantitative techniques like statistical analysis or qualitative methods like thematic analysis. They should be able to interpret findings accurately and draw meaningful conclusions based on their data.
- Assessments should gauge student-teachers' ability to think critically and solve research-related problems. This includes identifying and addressing methodological issues, adapting research designs in response to unexpected challenges, and making informed decisions throughout the research process.

- Effective communication of research findings is essential. Assessments should evaluate student-teachers' ability to write clear, coherent research proposals, reports, and presentations. They should also demonstrate proficiency in academic writing conventions and citation styles.
- Encouraging reflection on their research experiences allows student-teachers to recognize their strengths and areas for improvement. Assessments could include opportunities for self-evaluation where students assess their research process, identify challenges faced, and outline strategies for future improvement.
- Collaborative learning experiences can enhance student-teachers' research skills. Incorporating peer review and feedback sessions into assessments encourages students to engage critically with each other's work, fostering a culture of continuous improvement.
- Providing constructive feedback and guidance on research skills can prepare student-teachers for future careers in academia or educational leadership roles.

Overall, the assessment of post-graduate student-teachers in conducting primary research should be comprehensive, focusing on developing theoretical knowledge and practical research skills essential for their professional growth in the field of education.

Compliance with ethical standards

Disclosure of conflict of interest

I hereby state that there no conflict of interest in this work.

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