A STUDY OF TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE AMONG ENGLISH PEDAGOGY TEACHER TRAINEES OF SECONDARY LEVEL

SUMMARY

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SUMMARY

Introduction

The rise of the knowledge-based global economy has created unprecedented demands for revamping education systems, including teacher education. Over the past five decades, particularly after the COVID-19 pandemic, significant challenges have emerged for school, higher, and teacher education worldwide. These challenges have reshaped the educational landscape, compelling institutions and educators to utilize new technologies in the classroom and the teaching-learning process. Reforming India's teacher education system is essential to address these challenges effectively. The rapid changes in technology and the slow acceptance among teachers accustomed to traditional classroom management and administration make integrating ICT a complex task. The current knowledge society demands that education prepare future citizens to tackle emerging problems, which requires a transformational change in the education system. The education system is witnessing a shift from traditional teaching methods to digitizing the pedagogical approach through technological devices. Teacher training courses in India aim to teach aspiring educators interactive and improved methods of teaching, enhancing the teaching and learning experiences through the integration of ICT. To prepare humane and professional teachers, teacher education must be both global and transformational. Integrating ICT with pedagogy is necessary to achieve the 21st century skills and to transform traditional classroom practices, teaching methodologies, pedagogical practices, evaluation systems, and the overall teaching-learning environment.

TPCK was introduced to the educational research domain as a theoretical framework to understand the knowledge teachers need for effective technology integration (Mishra & Koehler, 2006). The acronym TPCK was later changed to TPACK (pronounced "tee-pack") to make it easier to remember and to create a more cohesive representation of the three types of knowledge it encompasses TK, PK, and CK (Thompson & Mishra, 2007–2008). The TPACK framework expands on Shulman’s concept of PCK by including technology knowledge as it relates to both content and pedagogical knowledge. The integration of technology in education is an ongoing and dynamic process, requiring teachers to continuously develop their skills across multiple

dimensions. This comprehensive study aims to provide a detailed analysis of the most important skills among English pedagogy teacher trainees of the secondary level. By examining the eight dimensions of Technological Knowledge, Pedagogical Knowledge, Content Knowledge, Info-savvy skills, Techno-pedagogic skills, Techno-management skills, Techno-living skills, and Techno-special skills, this research will offer valuable insights into the current state of teacher training programs and identify areas for improvement. The TPACK framework, introduced by Mishra and Koehler (2006), has been widely recognized for its holistic approach to including technology in education. This study is rooted in the need to assess and enhance the skill sets of English pedagogy teacher trainees in Lucknow. By examining the interplay between TK, PK, and CK, this study aims to provide insights into how teacher education programs can better prepare trainees for the challenges of modern classrooms.

Rationale of the Study

In the 21st century, integrating technology into education has become essential, requiring educators to possess not just content knowledge but also technological and pedagogical skills. In Uttar Pradesh, implementing TPACK among teachers is crucial for enhancing the quality of education. This study aimed to assess the current levels of TPACK knowledge and corresponding techno-pedagogical skills among teachers in the region. By identifying gaps and areas for improvement, the research provided insights into tailoring professional development programs to meet educators' specific needs, ultimately enhancing teaching practices and student outcomes. This research is pivotal for guiding policymakers, educational institutions, and teacher training programs in addressing existing disparities and implementing necessary steps to bridge these gaps.

In today's dynamic educational environment, the integration of technology into teaching is critical. The rise of digital tools has revolutionized traditional pedagogical approaches, necessitating a deep knowledge of TPACK among teacher trainees. This study examined the essential competencies among secondary-level English Pedagogy Teacher Trainees in government and private institutions, encompassing male and female trainees from urban and rural backgrounds. The study dimensions—including TK, PK, CK, Information-savvy skills, Techno-pedagogic skills, Techno-management skills, Techno-living skills,

and Techno-special skills—formed a comprehensive framework for evaluating modern educational competencies.

In Lucknow, where urban and rural institutions coexist, disparities in technological knowledge among trainees are notable. Urban institutions often benefit from better technological resources, whereas rural counterparts may encounter challenges like inadequate infrastructure and limited internet access. This research delved into these disparities, assessing their impact on overall trainee preparedness. Additionally, the study explored pedagogical competencies critical to teacher effectiveness, as outlined by Shulman (1987), examining their development across government and private institutions and considering the influence of institutional support and resources. The research also investigated differences in pedagogical approaches between urban and rural settings, offering insights into the unique challenges and opportunities present in each context.

The study evaluated the techno-management skills of teacher trainees, looking at their ability to handle technological challenges in the classroom. It also examined the support systems in place within institutions to assist teachers with technical issues. The study investigated the techno-living skills of English pedagogy teacher trainees, considering how well they can navigate the digital landscape while maintaining ethical and balanced technology use. It explored the role of institutions in promoting digital citizenship and supporting trainees in developing these skills. The study assessed the techno-special skills of teacher trainees, identifying those with advanced technological competencies and exploring how these skills are nurtured within institutions. It also considered the impact of professional development opportunities and institutional support on the development of techno-special skills. The integration of technology in education is no longer optional but a necessity. This comprehensive study investigated the most important skills among English Pedagogy Teacher Trainees of the secondary level, focusing on both male and female trainees from urban and rural backgrounds in government and private institutions.

Statement of the Problem

The statement of the problem stated **“A Study of Technological Pedagogical Content Knowledge among English Pedagogy Teacher Trainees of Secondary Level”.**

Operational Definitions of the Key Terms

- **Technological Knowledge-** It refers to the English Pedagogy Teacher Trainees of Secondary Level's understanding of the technological function, operation, and its applicability in the teaching profession.
- **Pedagogical Knowledge-** It refers to the Knowledge applicable across a range of teaching practices among English Pedagogy Teacher Trainees of Secondary Level.
- **Content Knowledge-** It refers to the syllabus of English subject of UP Board and CBSE Board up to the Secondary Level.
- **Techno-Pedagogical Skills-** This refers to the ability to use technology for pedagogical reasons in teaching-learning; such skills are Info-savvy skills, Techno-pedagogical integration skills, Techno-management skills, Techno-living Skills, and Techno-special skills.
- **Teacher Trainees of the Secondary Level-** It refers to English Pedagogy Teacher Trainees of the Secondary Level, engaged in the professional preparation and training of future teachers of the Secondary Level.

Research Questions

1) What is the Technological Knowledge of Teacher Trainees of the Secondary Level?

2) What is the Pedagogical Knowledge of Teacher Trainees of the Secondary Level?

3) What is the Content Knowledge of Teacher Trainees of the Secondary Level?

4) What is the Technological Pedagogical Content Knowledge Level of Teacher Trainees of the Secondary Level?

5) What are the Techno-Pedagogical Skills of Teacher Trainees of the Secondary Level?

6) What is the correlation between the Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Teacher Trainees of the Secondary Level?

7) What are the most important factors of Techno-Pedagogical Skills for Teacher Trainees of Government/ Government Aided Institutions and Private Institutions of the Secondary Level?

Objectives of the Study

1) To study the Technological Knowledge of Teacher Trainees of the Secondary Level.

1.1) To compare the mean scores of Technological Knowledge between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

1.2) To compare the mean scores of Technological Knowledge between Urban and Rural Teacher Trainees of the Secondary Level.

1.3) To compare the mean scores of Technological Knowledge between Male and Female Teacher Trainees of the Secondary Level.

2) To study the Pedagogical Knowledge of Teacher Trainees of the Secondary Level.

2.1) To compare the mean scores of Pedagogical Knowledge between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

2.2)To compare the mean scores of Pedagogical Knowledge between Urban and Rural Teacher Trainees of the Secondary Level.

2.3) To compare the mean scores of Pedagogical Knowledge between Male and Female Teacher Trainees of the Secondary Level.

3) To study the Content Knowledge of Teacher Trainees of the Secondary Level.

3.1) To compare the mean scores of Content Knowledge between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

3.2) To compare the mean scores of Content Knowledge between Urban and Rural Teacher Trainees of the Secondary Level.

3.3) To compare the mean scores of Content Knowledge between Male and Female Teacher Trainees of the Secondary Level.

4) To study the Technological Pedagogical Content Knowledge of Teacher Trainees of the Secondary Level.

4.1) To compare the levels of Technological Pedagogical Content Knowledge between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

4.2) To compare the levels of Technological Pedagogical Content Knowledge between Urban and Rural Teacher Trainees of the Secondary Level.

4.3) To compare the levels of Technological Pedagogical Content Knowledge between Male and Female Teacher Trainees of the Secondary Level.

5) To study the Techno-Pedagogical Skills of Teacher Trainees of the Secondary Level.

5.1) To compare the levels of Techno-Pedagogical Skills between Teacher Trainees of Government/Government-aided institutions and Private Institutions of the Secondary Level.

5.2) To compare the levels of Techno-Pedagogical Skills between Urban and Rural Teacher Trainees of the Secondary Level.

5.3) To compare the levels of Techno-Pedagogical Skills between Male and Female Teacher Trainees of the Secondary Level.

6) To study the correlation between Technological Pedagogical Content Knowledge and TechnoPedagogical Skills in the Teacher Trainees of the Secondary Level.

6.1) To study the correlation between Technological Pedagogical Content knowledge and Techno-Pedagogical Skills in the Teacher Trainees of Government/Government-aided Institutions of the Secondary Level.

6.2) To study the correlation between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in the Teacher Trainees of Private Institutions of the Secondary Level.

6.3) To study the correlation between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Urban Teacher Trainees of the Secondary Level.

6.4) To study the correlation between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Rural Teacher Trainees of the Secondary Level.

6.5) To study the correlation between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Male Teacher Trainees of the Secondary Level.

6.6) To study the correlation between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Female Teacher Trainees of the Secondary Level.

7) What are the most important factors of Techno-Pedagogical Skills for Teacher Trainees of the Secondary Level?

7.1) What are the most important factors of Techno-Pedagogical Skills for Teacher Trainees of Government/ Government Aided Institutions and Private Institutions of the Secondary Level?

7.2) What are the most important factors of Techno-Pedagogical Skills for Urban and Rural Teacher Trainees of the Secondary Level?

7.3) What are the most important factors of Techno-Pedagogical Skills for Male and Female Teacher Trainees of the Secondary Level?

Hypotheses

H 1.1: There is no significant difference in the mean scores of Technological Knowledge between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

H0 1.2: There is no significant difference in the mean scores of Technological Knowledge between Urban and Rural Teacher Trainees of the Secondary Level.

H0 1.3: There is no significant difference in the mean scores of Technological Knowledge between Male and Female Teacher Trainees of the Secondary Level.

H0 2.1: There is no significant difference in the mean scores of Pedagogical Knowledge between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level. H 2.2: There is no significant difference in the mean scores of Pedagogical Knowledge between Urban and Rural Teacher Trainees of the Secondary Level.

H0 2.3: There is no significant difference in the mean scores of Pedagogical knowledge between Male and Female Teacher Trainees of the Secondary Level.

H0 3.1: There is no significant difference in the mean scores of Content Knowledge between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level. H0 3.2: There is no significant difference in the mean scores of Content Knowledge between Urban and Rural Teacher Trainees of the Secondary Level.

H0 3.3: There is no significant difference in the mean scores of Content Knowledge between Male and Female Teacher Trainees of the Secondary Level.

H0 4.1: There is no significant difference in the levels of Technological Pedagogical Content Knowledge between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

H0 4.2: There is no significant difference in the levels of Technological Pedagogical Content Knowledge between Urban and Rural Teacher Trainees of the Secondary Level.

H0 4.3: There is no significant difference in the levels of Technological Pedagogical Content Knowledge between Male and Female Teacher Trainees of the Secondary Level.

H0 5.1: There is no significant difference in the levels of Techno-Pedagogical Skills between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level. H0 5.1.1: There is no significant difference in the mean scores of Info-Savvy Skills between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level. H0 5.1.2: There is no significant difference in mean scores of Techno-Pedagogical Integration Skills between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

H0 5.1.3: There is no significant difference in the mean scores of Techno-Management Skills between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

H 5.1.4: There is no significant difference in the mean scores of Techno-Living Skills between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level. H0 5.1.5: There is no significant difference in the mean scores of Techno-Special Skills between Teacher Trainees of Government/Government-aided Institutions and Private Institutions of the Secondary Level.

H0 5.2: There is no significant difference in the levels of Techno-Pedagogical Integration Skills between Urban and Rural Teacher Trainees of the Secondary Level.

H0 5.2.1: There is no significant difference in the mean scores of Info-Savvy Skills between Urban and Rural Teacher Trainees of the Secondary Level.

H0 5.2.2: There is no significant difference in the mean scores of Techno-Pedagogical Integration Skills between Urban and Rural Teacher Trainees of the Secondary Level.

H0 5.2.3: There is no significant difference in the mean scores of Techno-Management Skills between Urban and Rural Teacher Trainees of the Secondary Level.

H0 5.2.4: There is no significant difference in the mean scores of Techno-Living Skills between Urban and Rural Teacher Trainees of the Secondary Level.

H0 5.2.5: There is no significant difference in the mean scores of Techno-Special Skills between Urban and Rural Teacher Trainees of the Secondary Level.

H0 5.3: There is no significant difference in the levels of Techno-Pedagogical Skills between Male and Female Teacher Trainees of the Secondary Level.

H0 5.3.1: There is no significant difference in the mean scores of Info-Savvy Skills between Male and Female Teacher Trainees of the Secondary Level.

H0 5.3.2: There is no significant difference in the mean scores of Techno-Pedagogical Integration Skills between Male and Female Teacher Trainees of the Secondary Level.

H0 5.3.3: There is no significant difference in the mean scores of Techno-Management Skills between Male and Female Teacher Trainees of the Secondary Level.

H0 5.4.4: There is no significant difference in the mean scores of Techno-Living Skills between Male and Female Teacher Trainees of the Secondary Level.

H 5.4.5: There is no significant difference in the mean scores of Techno-Special Skills between Male and Female Teacher Trainees of the Secondary Level.

H0 6.1: There is no significant relationship between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in the Teacher Trainees of Government/Government aided Institutions of the Secondary Level.

H0 6.2: There is no significant relationship between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in the Teacher Trainees of Private Institutions of the Secondary Level.

H0 6.3: There is no significant relationship between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Urban Teacher Trainees of the Secondary Level.

H0 6.4: There is no significant relationship between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Rural Teacher Trainees of the Secondary Level.

H0 6.5: There is no significant relationship between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Male Teacher Trainees of the Secondary Level.

H0 6.6: There is no significant relationship between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills in Female Teacher Trainees of the Secondary Level.

Delimitations of the Study

- The study is confined to three central dimensions of TPACK, i.e. Technology, Pedagogy, and Content Knowledge.
- The study is confined to the five major dimensions of Techno-Pedagogical Skills, i.e. Info-Savvy Skills, Techno-Pedagogy Integration Skills, Techno-Management Skills, Techno-Living Skills, and Techno-Special Skills.
- Only B.Ed. Second-year teacher trainees are taken as a sample for this study.
- The Sample for the study is drawn from the Lucknow division only.

Methodology of the Study

The present study is a descriptive research in survey research design in which the researcher is interested in exploring the question and the answer ‘what’ is the Technological, Pedagogical, and Content Knowledge of teacher trainees of the secondary level. Thus descriptive survey design for quantitative data collection and testing the hypotheses have been used in the present study.

Research Design

The current study utilized an exploratory sequential mixed-method design. This approach involves both qualitative and quantitative data collection and analysis within the same study.

Population

A population refers to any group of individuals sharing one or more common characteristics that interest the researcher (Best, J. and Kahn, 2010, p.13). In this study, the population consists of English pedagogy teacher trainees and teacher educators from B.Ed. colleges in six districts of the Lucknow division.

Sample for the Qualitative Study

The sample for the qualitative study includes English pedagogy teacher trainees and their teacher educators of the secondary level selected from the B.Ed. Colleges of Lucknow division.

Sample for Quantitative Study

In the study, a multistage random sampling technique was employed. In the Lucknow division, there are 6 districts; one Lucknow itself, and 5 other districts namely; Sitapur, Hardoi, Unnao, Lakhimpur Kheri, and Raebareli. A required number of B.Ed. Colleges were selected randomly from each division. B.Ed. Colleges are taken from 10% of the total of Government or Government-aided Institutions and 10% of the total of Private Institutions. Thereafter from Private B.Ed. Colleges, 310 students were surveyed, and from Government-aided B.Ed. Colleges, 99 students were surveyed purposely. The colleges were selected through random sampling, where all the available English Pedagogy teacher trainees were selected.

Tools Used

Techno-Pedagogical Skills Scale, Technological, Pedagogical, and Content Knowledge Questionnaire for English Pedagogy Teacher Trainees of Secondary Level, Focus Group Discussion on Techno-Pedagogical Skills, Semi-structured Interview Schedule for Techno Pedagogical Skills.

Statistical Techniques Used

The statistical analysis in this study was built upon the foundation of data collection. Statistical procedures encompass a range of methods employed to scrutinize organized data or data that has been gathered to unveil fundamental truths that underpin dependable conclusions and generalizations. In this study, the data underwent analysis and interpretation using measures such as Mean, Standard Deviation (S.D.), Pearson's Product Moment Correlation, Percentage analysis, Factor analysis, and t-test, facilitated by the utilization of SPSS software.

Findings and Discussion

The present study is an endeavor to analyze the differences between the Techno Pedagogy Skills of Teacher trainees of English pedagogy of the Secondary level across their type of institution, gender, and locale. The study extends its scope to analyze the technological, pedagogical, and content Knowledge test for English pedagogy teacher trainees for the Secondary level. The findings and discussion of which are provided below-

- The finding revealed that there is no significant difference in technological knowledge between teacher trainees of government/government-aided institutions and private institutions of the secondary level. A study by Sharma and Gupta (2022) found similar results, indicating that integrating technology in teacher education programs has become a priority across both government and private sectors, leading to comparable levels of technological proficiency among teacher trainees.
- A significant difference is found in technological knowledge between urban and rural teacher trainees of the secondary level. Urban teacher trainees performed higher than rural teacher trainees. According to a study by Patel and Verma (2023), urban teacher trainees benefit from more frequent exposure to digital tools and resources, resulting in higher technological competence compared to those in rural areas. Urban teacher trainees often have greater access to technological

resources and better internet connectivity compared to their rural counterparts (Patel & Verma, 2023).

- There is a significant difference in technological knowledge between male and female teacher trainees of the secondary level. Female teacher trainees scored higher in the field of technology. Females were found to be more motivated to learn new things. Research by Singh and Kaur has contradictory results, their finding indicates that male teacher trainees generally have more opportunities and encouragement to engage with technology, leading to higher proficiency levels than female teacher trainees (Singh & Kaur, 2023).
- A significant difference is found in pedagogical knowledge between teacher trainees of government/government-aided institutions and private institutions of the secondary level. Teacher trainees from government/government-aided institutions scored significantly higher than those from private institutions. It is observed at the time of qualitative data collection that, in Government-aided Institutions, the faculty is more qualified and experienced to share knowledge with students. They have more opportunities to learn from different Faculty Development Programs, Workshops, Seminars, and Orientations. Secondary schools are also approachable and easily available for the training of the teacher trainees from these Government-aided Institutions. Resources are easily available for learning and teaching.
- The result indicated that there is no significant difference in pedagogical knowledge between urban and rural teacher trainees. This aligns with findings from a study by Desai and Mehta (2022), which showed that despite differences in technological knowledge, the core pedagogical training remains consistent, ensuring that all teacher trainees receive a similar quality of education in pedagogy.
- The finding revealed that there is no significant difference in pedagogical knowledge between male and female teacher trainees of the secondary level. The present finding aligns with previous research that indicates gender does not play a decisive role in pedagogical skills acquisition. For instance, a study by Kim and Seo (2021) concluded that gender does not significantly influence pedagogical

knowledge, emphasizing that both male and female teacher trainees exhibit comparable levels of pedagogical understanding when provided with similar educational opportunities and resources.

- There is a significant difference found in content knowledge between teacher trainees of government/government-aided institutions and private institutions. Teacher trainees of government/government-aided students scored better than teacher trainees of private institutions in the field of Content Knowledge. It is observed and discussed in the time of interview and focus group discussion that students from Government-aided Institutions are mostly meritorious students. They have sound knowledge about the subject and concepts, and teachers from these Institutions are well-qualified, updated, and experienced. Library facilities also contribute to gaining knowledge; teacher trainees from Government-aided Institutions have better access to libraries, books, and other learning materials.
- The result indicated that there is no significant difference in content knowledge between urban and rural teacher trainees of the secondary level. It suggested that geographical location does not influence the content knowledge among teacher trainees of the secondary level.
- There is no significant difference found in content knowledge between male and female teacher trainees corroborating with studies such as those by Liu et al. (2021), which indicated that gender does not significantly affect content knowledge acquisition among teacher trainees. This parity suggests that educational strategies and content delivery are equally effective for both genders.
- The significant difference found in the Technological Pedagogical Content Knowledge between teacher trainees of government/government-aided institutions and private institutions of the secondary level. Teacher trainees from government/government-aided institutions scored higher than teacher trainees from private institutions. The contradictory result was found in the previous research that private institutions often have better access to technological tools and training, resulting in higher TPACK scores among their teacher trainees compared to those from government institutions (Patel & Mehta, 2022). However at the time of Focus group discussion and interviews although private institutions

often have better access to technological tools and training but in Government-aided Institutions, the faculty is more qualified and experienced to share knowledge with students. Students from Government-aided Institutions are mostly meritorious students. They have sound knowledge about the subject and concepts, and teachers from these Institutions are well-qualified, updated, and experienced. Library facilities also contribute to gaining knowledge; teacher trainees from Government-aided Institutions have better access to libraries, books, and other learning materials.

- The study found no significant difference in TPACK between urban and rural teacher trainees, which can be attributed to efforts to enhance technological education in rural areas. Studies by Das and Sahu (2023) support this finding, indicating that rural schools are increasingly adopting technology-enhanced teaching practices, narrowing the gap with urban schools.
- The significant differences in TPACK between male and female teacher trainees might reflect differing levels of confidence and experience with technology. The research findings were in favor of female respondents. On the contrary, research by Menon and Thomas (2021) suggests that male teacher trainees often have more exposure to technology, possibly explaining the higher TPACK scores, his finding highlighted the need for targeted interventions to boost technological confidence and skills among female teacher trainees. In the case of this hypothesis, the present finding had contradictory results.
- The research findings indicate that there is a significant difference in techno-pedagogical skills between teacher trainees of government-aided institutions and private institutions, with government-aided institution teacher trainees demonstrating stronger skills. This result aligns with several recent studies in the Indian context. For instance, Yadav and Mehra (2022) found that government-aided institution teacher trainees had better access to technological resources and training programs, which significantly enhanced their techno-pedagogical skills compared to their private institution counterparts. Additionally, Sharma and Gupta (2021) noted that government initiatives and funding for technological

advancements in government-aided institutions have contributed to the superior performance of these teacher trainees in integrating technology with pedagogy.

- The finding that there is no significant difference in the mean scores of Techno-Pedagogical Skills between Urban and Rural Teacher trainees aligned with recent studies. A study by Asoodar et al. (2020) found no substantial disparity in techno-pedagogical skills among teachers from different geographical backgrounds, attributing this to the widespread availability of technology and online resources, which have leveled the playing field in educational technology integration.
- The findings of this research indicated that there is no significant difference in the overall Techno-Pedagogical Skills between male and female teacher trainees, though, there was a difference in mean scores, and the mean score of females was a little higher than males. This aligns with the results of earlier studies (Gurung & Rutledge, 2014; Özen & Suna, 2019) which suggest that gender does not play a significant role in the overall acquisition of techno-pedagogical skills among teacher trainees. However, the significant differences observed in specific skills such as Info-Savvy Skills, Techno-Pedagogical Integration Skills, Techno-Management Skills, Techno-Living Skills, and Techno-Special Skills suggest nuanced gender differences in certain areas of technological proficiency. These findings are consistent with previous research which has highlighted that male and female educators may have differing strengths in specific technological skills (Kay, 2006; Gil-Flores, Rodríguez Santero, & Torres-Gordillo, 2017).
- The results indicated that there was a significant and positive correlation between TPACK and Techno-Pedagogical Skills among teacher trainees from different institutional backgrounds, including government/government-aided institutions, private institutions, as well as those from urban and rural areas. These findings were in line with research by Koehler and Mishra (2009), which suggested that while TPACK is a comprehensive framework, its practical application in teaching practices can vary widely and correlate with techno-pedagogical skills.
- Further, the presence of a positive and significant relationship between TPACK and Techno- Pedagogical Skills in both male and female teacher trainees suggested that gender influences the integration of TPACK into teaching

practices. This supports the findings of studies that have explored the gender-neutral nature of TPACK integration (Chai, Koh, & Tsai, 2010). These findings have important implications for the design and implementation of teacher training programs. The observed differences in specific techno-pedagogical skills suggest a need for targeted training that addresses the unique needs and strengths of male and female teacher trainees. Tailored professional development programs could help in bridging these gaps and enhancing the overall techno-pedagogical competencies of teacher trainees.

Conclusion

The Techno Pedagogy Skills encompass a multifaceted set of competencies that are crucial for educators to effectively integrate technology into teaching and learning processes. In the present study, these skills were examined in the context of teacher trainees specializing in English pedagogy at the secondary level. The investigation extended beyond mere theoretical understanding to encompass practical application, with a focus on how these skills manifest across different dimensions such as institutional affiliation, gender, and locale. Through an analysis of these knowledge domains, the study aimed to uncover nuanced differences among teacher trainees. Additionally, the assessment of various skills domains, including info-savvy skills, techno-pedagogic skills, techno-management skills, techno-living skills, and techno-special skills, provided a holistic view of the Techno Pedagogy Skills landscape. These skills domains encompass a range of competencies, from the ability to critically evaluate and use information to the skillful integration of technology into instructional practices. The analysis of the data from teacher trainees at the secondary level reveals several significant insights into the comparative knowledge and skills across different demographics and institutional backgrounds. Firstly, the lack of significant difference in technological knowledge between teacher trainees of government/government-aided institutions and private institutions suggests that efforts to integrate technology in teacher education programs have been effective across both sectors. This indicates a uniform emphasis on technological proficiency, which is vital for modern educational environments. However, when examining the

geographical disparities, urban teacher trainees displayed significantly higher technological knowledge compared to their rural counterparts. This can be attributed to the greater exposure to digital tools and better internet connectivity in urban areas, which enhances technological competence. The rural teacher trainees' comparatively lower scores highlight the ongoing challenge of technological accessibility and infrastructure in rural settings. Gender differences also emerged in technological knowledge, with female teacher trainees outperforming male teacher trainees. This finding is particularly noteworthy as it suggests a higher motivation among female teacher trainees to engage with and learn new technologies. Despite this, there is evidence that contradicts this trend, highlighting the complex and multifaceted nature of gender dynamics in technological proficiency. In terms of pedagogical knowledge, teacher trainees from government/government-aided institutions scored significantly higher than those from private institutions. This is likely due to the higher qualifications and experience of faculty in government-aided institutions, as well as better access to professional development opportunities and resources such as libraries and workshops. These factors collectively contribute to a richer learning environment for the teacher trainees in these institutions. No significant difference was found in pedagogical knowledge between urban and rural teacher trainees, indicating that the core pedagogical training is consistent across different geographical areas. Similarly, there is no significant difference in pedagogical knowledge between male and female teacher trainees, underscoring that gender does not influence pedagogical skills acquisition when educational opportunities and resources are equitable. The data also revealed a significant difference in content knowledge, with teacher trainees from government/government-aided institutions scoring higher than those from private institutions. This can be linked to the higher academic standards and more rigorous selection criteria in government-aided institutions, along with superior access to learning materials. However, no significant differences were noted in content knowledge between urban and rural teacher trainees and also between male and female teacher trainees, suggesting a level playing field in content knowledge acquisition irrespective of geography or gender. The analysis of TPACK showed that teacher trainees from government/government-aided institutions

scored higher than those from private institutions. This could be due to the more comprehensive support systems and qualified faculty in government-aided institutions, even though private institutions might have better access to technological tools. There was no significant difference in TPACK between urban and rural teacher trainees, reflecting successful efforts to enhance technological education in rural areas. The study identified a significant gender difference in TPACK, with female teacher trainees scoring higher, which could be indicative of differing levels of confidence and motivation in engaging with technology. However, the data also suggests that male teacher trainees often have more exposure to technology, highlighting the need for targeted interventions to bolster technological confidence and skills among all teacher trainees. There is a significant difference in techno-pedagogical skills between teacher trainees of government-aided institutions and private institutions, with government-aided institution teacher trainees demonstrating stronger skills. No significant differences were found in the overall Techno-Pedagogical Integration Skills between urban and rural teacher trainees, suggesting that the availability of technology and online resources has helped bridge the geographical divide in educational technology integration. However, significant differences in specific skills such as Techno-Management Skills and Techno-Special Skills indicate that urban teacher trainees often have better access to professional development and specialized training programs. The results further revealed that there is no significant difference in the overall Techno-Pedagogical Skills between male and female teacher trainees, although specific skills showed nuanced gender differences. These findings emphasize that while gender does not significantly impact overall techno-pedagogical competencies, there are areas where targeted training can help bridge specific skills gaps. Results also revealed that there is a positive correlation between Technological Pedagogical Content Knowledge and Techno-Pedagogical Skills among English pedagogy teacher trainees of the secondary level. Overall, the study highlighted the complexities in the acquisition of pedagogical, content, and technological pedagogical content knowledge among teacher trainees. While efforts to integrate technology into education have led to comparable technological proficiency across different institutional types, significant disparities

persist based on geographical and gender differences. These insights underscored the need for equitable resource distribution, targeted interventions, and enhanced training programs to ensure balanced and effective educational outcomes for all teacher trainees. The findings provided a comprehensive understanding of the current state of teacher education, highlighting areas for improvement and the importance of ongoing efforts to enhance the technological, pedagogical, and content knowledge of teacher trainees. By examining Techno Pedagogy Skills that influence the acquisition and manifestation of these skills, educational stakeholders can work towards creating environments that foster the development of Techno Pedagogy Skills among educators, ultimately enhancing the quality of education provided to students at the secondary level.

Educational Implications

- **Curriculum Design and Development:** The curriculum for teacher training programs should incorporate the TPACK framework comprehensively. This would ensure that future educators are equipped with the necessary skills to effectively integrate technology into their pedagogy and content delivery. Including specific modules that enhance technological literacy among teacher trainees can empower them to use various digital tools and resources efficiently. This is crucial for preparing them to handle diverse technological challenges in the classroom.
- **Teacher Training and Professional Development:** Establishing ongoing professional development opportunities focusing on TPACK can help in keeping teacher trainees updated with the latest educational technologies and pedagogical strategies. FDP programs, workshops, seminars, orientations, and hands-on training sessions should be organized. Proper incentives should be given for making teachers motivated and creating a collaborative environment where experienced teachers mentor new teacher trainees and can facilitate the sharing of best practices in integrating technology with pedagogy and content knowledge.

- **Teaching Methodologies and Classroom Practices:** Encouraging teacher trainees to adopt student-centered learning approaches can significantly enhance student engagement and learning outcomes. Utilizing technology to create interactive and personalized learning experiences aligns with contemporary educational needs. Promoting blended learning models that combine traditional teaching methods with online resources can cater to diverse learning styles and needs. Teacher trainees should be adept at designing and implementing blended learning environments.
- **Assessment and Evaluation:** Developing assessment strategies that evaluate not only content knowledge but also the ability to integrate technology and pedagogy is essential. Teacher trainees should be trained to create assessments that measure students' critical thinking, problem-solving, and digital literacy skills. Encouraging reflective practices among teacher trainees can help them critically analyze their teaching methods and the effectiveness of integrating technology into their pedagogy. Reflection journals and peer reviews can be part of this process.
- **Resource Allocation and Infrastructure:** Schools and teacher training institutions should invest in the latest technological tools and infrastructure to support the effective implementation of TPACK. This includes providing access to computers, smart boards, educational software, and high-speed internet. Establishing digital libraries and repositories that provide access to a vast range of educational resources can support teacher trainees in staying updated with the latest developments in their subject areas and teaching methodologies.
- **Policy and Administration:** Policymakers should formulate and implement policies that promote the integration of technology in education. This includes funding for technological upgrades, teacher training programs, and research initiatives focusing on TPACK. Educational leaders and administrators should have a clear vision for integrating technology in education and should actively support and motivate teacher trainees to adopt innovative teaching practices.

- **Addressing Challenges and Barriers:** Providing support and encouragement to teacher trainees to overcome resistance to adopting new technologies and teaching methodologies is crucial. Change management strategies should be part of the training programs. Efforts should be made to ensure that all teacher trainees, regardless of their socio-economic background, have equal access to technological resources and training opportunities.

Investigating the most important skills among English pedagogy teacher trainees through the TPACK framework has far-reaching educational implications. By focusing on Technological Knowledge, Pedagogical Knowledge, and Content Knowledge, and emphasizing Techno-Pedagogical Skills, educational institutions can prepare future educators to meet the demands of the 21st-century classroom effectively.

- **Suggestions for Educational Administrators:** Educational administrators play a pivotal role in policies for teacher education programs. Translating research findings into actionable policies and practices within educational institutions. Armed with the insights from this study, administrators can initiate targeted interventions to bridge the identified disparities in Techno-Pedagogical Skills among teacher trainees. They can allocate resources strategically, such as funding for professional development programs or technology infrastructure upgrades, to ensure that all teachers receive comprehensive training regardless of their institutional affiliation. Additionally, administrators can foster collaboration between government-aided and private institutions to share best practices and resources, ultimately enhancing the quality of teacher education across the board.
- **Suggestions for Teacher Educators:** Teacher educators serve as the frontline facilitators in shaping the pedagogical skills of future teachers. With a nuanced understanding of the differences highlighted in this study, they can tailor their instructional methods and curriculum to address specific areas of need identified among teacher trainees. By incorporating targeted training modules focused on enhancing Techno Pedagogy Skills, teacher educators can equip teacher trainees with the necessary competencies to navigate the digital landscape of modern education. Moreover, they can foster a culture of continuous improvement by providing ongoing

mentorship and support to ensure that teacher trainees are adept at integrating technology into their teaching practices effectively.

- **Suggestions for Teacher trainees:** As the direct beneficiaries of teacher education programs, teacher trainees can leverage the findings of this study to advocate for a more inclusive and comprehensive training curriculum. Armed with insights into the disparities across different dimensions of Techno Pedagogy Skills, teacher trainees can actively engage with their educators and administrators to voice their concerns and suggest improvements. They can also take proactive measures to enhance their skills by seeking out additional training opportunities, participating in workshops, and staying abreast of emerging technologies and pedagogical trends. By taking ownership of their professional development, teacher trainees can position themselves as confident and competent educators ready to meet the evolving needs of their students.
- **Suggestions for Policy Makers**: Policymakers wield significant influence in shaping the landscape of teacher education and professional development. Informed by the findings of this study, they can enact policies that prioritize equity and inclusivity in teacher training programs. This may involve allocating funding for initiatives aimed at narrowing the gap in Techno Pedagogy Skills between different types of institutions and demographic groups. Additionally, policymakers can promote the integration of digital literacy and pedagogy into national education standards, ensuring that all teachers are adequately prepared to leverage technology in their classrooms. By aligning policy decisions with research evidence, policymakers can drive meaningful change and foster an environment conducive to the holistic development of educators.

Suggestions for Further Studies

The future scope of this study encompasses several avenues for further exploration and research. Firstly, longitudinal studies could be conducted to track the development of techno-pedagogical skills among teacher trainees over an extended period. Such longitudinal research would provide insights into how these skills evolve and the factors influencing their progression. Additionally, qualitative research methods, such as interviews or focus groups, could complement quantitative data by offering deeper insights into the experiences and perceptions of teacher trainees regarding their techno-pedagogy skills and training programs. Future studies could focus on the interplay of the sub-dimensions of TPACK; that is Technological Pedagogical Knowledge, Technological Content Knowledge, Pedagogical Content Knowledge, and Technological Pedagogical Content Knowledge. Moreover, future studies could focus on evaluating the effectiveness of specific interventions or training programs aimed at addressing the disparities identified in this study. For example, targeted professional development workshops or courses could be designed to enhance pedagogical knowledge among teacher trainees. Evaluating the impact of such interventions on improving techno-pedagogical skills would be valuable for informing educational policy and practice. Furthermore, with the rapid advancements in educational technology, future research could explore how emerging technologies, such as artificial intelligence or virtual reality, can be integrated into teacher training programs to enhance techno-pedagogical skills. Investigating the effectiveness of innovative teaching methods and tools in improving teacher competencies and student learning outcomes would be an essential area of inquiry. Expanding the geographical scope of the study to include a more diverse range of regions and cultural contexts would also be beneficial. Comparing techno-pedagogical skills across different countries or educational systems could provide valuable insights into the influence of sociocultural factors on teacher training and professional development practices. Additionally, exploring the impact of techno-pedagogical skills on student learning outcomes and classroom practices would be an important direction for future research. Understanding how teacher competencies in integrating technology into pedagogy affect student engagement, motivation, and achievement could inform

strategies for enhancing teaching and learning in secondary education settings. Overall, the future scope of this study encompasses a wide range of research directions, including longitudinal studies, intervention evaluations, exploration of emerging technologies, cross-cultural comparisons, and investigations into the impact of techno-pedagogical skills on student learning. These avenues of research have the potential to contribute significantly to the enhancement of teacher training programs and educational practices aimed at preparing teachers to effectively integrate technology into their pedagogical approaches.