

A STUDY OF THE RELATIONSHIP BETWEEN ICT USAGE, TEACHERS' ATTITUDE TOWARDS ICT, AND SELF-EFFICACY AMONG SECONDARY SCHOOL TEACHERS IN PATNA DISTRICT, BIHAR

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Abstract

The integration of Information and Communication Technology (ICT) into school education has transformed teaching-learning processes across the world. In India, the implementation of the National Education Policy (NEP) 2020 has emphasized the effective use of digital technologies to improve educational quality, accessibility, and teacher effectiveness. However, the successful integration of ICT in classrooms depends not only on the availability of technological infrastructure but also on teachers' attitudes towards ICT and their belief in their own teaching capabilities, commonly referred to as teacher self-efficacy. Teachers with positive attitudes towards ICT and high self-efficacy are more likely to integrate digital technologies effectively into classroom instruction, thereby enhancing students' learning experiences. The present study aims to investigate the relationship between ICT usage, teachers' attitude towards ICT, and self-efficacy among secondary school teachers in Patna District, Bihar. The study proposes a descriptive survey research design involving a sample of 100 secondary school teachers selected from government and private secondary schools through an appropriate sampling technique. Standardized tools will be used to measure ICT usage, teachers' attitude towards ICT, and teacher self-efficacy. The collected data will be analyzed using descriptive and inferential statistical techniques such as Mean, Standard Deviation, Pearson's Product-Moment Correlation, independent sample *t*-test, one-way ANOVA, and Multiple Regression Analysis. The study is expected to identify the extent to which ICT usage and teachers' attitudes contribute to teacher self-efficacy. The findings may provide valuable insights for educational administrators, teacher educators, policymakers, curriculum developers, and school leaders in designing effective ICT-based professional development programmes. The study also intends to support the implementation of NEP 2020 by promoting technology-enabled teaching practices and strengthening teachers' confidence in using digital resources for quality education.

Keywords: Information and Communication Technology (ICT), ICT Usage, Teachers' Attitude towards ICT, Teacher Self-Efficacy, Secondary School Teachers, Patna District, NEP 2020.

1. Introduction

Education in the twenty-first century has undergone significant transformation due to rapid advancements in science, technology, and digital communication. Information and Communication Technology (ICT) has emerged as a vital component of modern education, revolutionizing teaching, learning, assessment, educational administration, and professional development. Digital tools such as computers, smart classrooms, multimedia, online learning

platforms, educational software, and artificial intelligence have become integral to effective classroom practices. In India, initiatives like Digital India, PM eVIDYA, DIKSHA, SWAYAM, e-Pathshala, and the National Education Policy (NEP) 2020 have emphasized the integration of ICT to enhance educational quality, accessibility, and innovation.

The successful implementation of ICT largely depends on teachers, who play a pivotal role in integrating technology into classroom instruction. Effective ICT usage requires not only technological infrastructure but also teachers' positive attitudes towards technology and confidence in their professional abilities. ICT usage refers to the extent to which teachers employ digital technologies for lesson planning, classroom teaching, assessment, communication, and professional development. Teachers who frequently use ICT can adopt learner-centred teaching methods, improve student engagement, and enhance learning outcomes.

Another important factor influencing technology integration is teachers' attitude towards ICT, which reflects their willingness and readiness to use digital technologies in teaching. Teachers with favourable attitudes are more likely to adopt innovative instructional strategies and effectively utilize ICT resources. Equally important is teacher self-efficacy, derived from Bandura's Social Cognitive Theory, which refers to teachers' belief in their ability to perform teaching tasks successfully. Teachers with high self-efficacy are generally more confident, innovative, and willing to integrate ICT into classroom practices.

The present study examines the relationship among ICT usage, teachers' attitude towards ICT, and self-efficacy among secondary school teachers in Patna District, Bihar. The findings are expected to provide valuable insights for teacher educators, school administrators, and policymakers in strengthening technology integration and enhancing teachers' professional effectiveness in line with the objectives of NEP 2020.

2. Review of Related Literature

Review of related literature is an indispensable part of any research investigation because it provides the theoretical and empirical foundation for the study. It enables the researcher to understand the existing body of knowledge, identify research gaps, refine research objectives, and select appropriate research methodology. In the field of educational technology, numerous national and international studies have examined the use of Information and Communication Technology (ICT), teachers' attitudes towards ICT, and teacher self-efficacy. However, these variables have often been studied independently, and relatively few investigations have explored their combined relationship, particularly among secondary school teachers in India. The present review summarizes significant studies related to the variables under investigation.

Information and Communication Technology has become an integral component of modern education, influencing teaching methodologies, classroom management, student engagement, and professional development. Teachers play a crucial role in determining the success of ICT integration because the availability of technological resources alone cannot ensure effective

classroom implementation. Teachers' beliefs, attitudes, confidence, and professional competencies largely determine whether ICT is successfully incorporated into teaching-learning activities. Consequently, researchers across the world have increasingly focused on understanding the factors that facilitate or hinder technology integration in schools.

One of the most comprehensive studies in this area was conducted by Tondeur, van Braak, Ertmer, and Ottenbreit-Leftwich (2017), who examined the relationship between teachers' pedagogical beliefs and technology integration through a systematic review of educational research. Their review revealed that teachers' beliefs and attitudes significantly influence the successful implementation of ICT in classrooms. The study concluded that positive pedagogical beliefs, continuous professional development, administrative support, and adequate technological infrastructure encourage teachers to integrate ICT effectively into teaching. However, the review primarily emphasized pedagogical beliefs and did not investigate teacher self-efficacy as a major psychological determinant of ICT usage. Similarly, Guillén-Gámez and Rodríguez-Fernández (2022) conducted a meta-analysis to investigate teachers' attitudes towards educational technology across different countries. Their findings indicated that teachers generally possess favourable attitudes towards ICT, particularly when adequate training opportunities and institutional support are available. The researchers reported that demographic factors such as gender had only a limited influence on teachers' attitudes, whereas professional development and digital competence played much more significant roles. Nevertheless, the study did not explore how teachers' attitudes towards ICT relate to teacher self-efficacy or actual classroom technology usage.

Another important contribution was made by Zeng, Wang, and Li (2022), who carried out a meta-analysis involving more than 7,700 teachers to examine the relationship between ICT integration self-efficacy and Technological Pedagogical Content Knowledge (TPACK). Their investigation demonstrated a strong positive relationship between teachers' confidence in using ICT and their technological pedagogical competencies. Teachers with higher ICT self-efficacy were more successful in integrating technology into classroom instruction and adapting innovative teaching strategies. However, their research focused mainly on ICT integration self-efficacy and TPACK without simultaneously considering teachers' attitudes towards ICT and overall technology usage.

The relationship between teacher self-efficacy and attitudes towards technology was further explored by Şahin and colleagues (2016). Using Structural Equation Modelling, the researchers examined teacher self-efficacy, computer self-efficacy, academic self-efficacy, and attitudes towards computer-supported education. Their findings revealed that teachers possessing higher levels of self-efficacy demonstrated significantly more positive attitudes towards educational technology and were more willing to adopt computer-supported instructional practices. Nevertheless, the participants were prospective teachers rather than practicing secondary school teachers, thereby limiting the applicability of the findings to school settings.

Recent research by Abualrob and Al-Saadi (2026) investigated the structural relationship between ICT integration and science teachers' self-efficacy. Employing Structural Equation Modelling, the study reported that effective ICT integration significantly enhanced teachers' confidence in classroom management, instructional planning, student engagement, and professional performance. Teachers who frequently utilized digital technologies demonstrated stronger beliefs in their teaching capabilities. However, the investigation focused exclusively on science teachers and did not compare teachers from different school management systems or educational contexts.

Within the Indian educational context, Ali and Siddiqui (2021) examined the influence of teacher self-efficacy and institutional infrastructure on ICT usage by extending the Unified Theory of Acceptance and Use of Technology (UTAUT). Their findings indicated that both teacher self-efficacy and adequate ICT infrastructure significantly influenced teachers' adoption of digital technologies in classrooms. The researchers emphasized that schools with better technological resources and institutional support experienced higher levels of ICT integration. However, teachers' attitudes towards ICT were not investigated as an independent psychological variable.

A systematic review conducted by Pal and Haque (2026) examined empirical studies concerning ICT and teachers' attitudes. The review concluded that teachers generally develop favourable attitudes towards ICT when they receive appropriate training, technical support, and opportunities for professional development. The authors also identified teacher self-efficacy as one of the important factors influencing successful technology adoption. Nevertheless, the review remained largely theoretical and did not provide empirical evidence from school teachers in Bihar or other educationally developing states.

Further evidence was provided by Bing and colleagues (2026) through a systematic review investigating the influence of professional development on teachers' self-efficacy, attitudes, and digital competencies. The review demonstrated that continuous professional development programmes significantly improve teachers' digital skills, increase self-confidence, and promote favourable attitudes towards educational technology. Teachers who regularly participated in ICT-related training programmes were more competent and confident in implementing technology-based instructional strategies. However, the review focused primarily on international studies and lacked empirical evidence from the Indian school education system.

Earlier investigations by Sang, Valcke, van Braak, and Tondeur also highlighted the importance of psychological factors in technology integration. Their research demonstrated that teachers' self-efficacy, positive attitudes towards ICT, institutional support, and availability of technological infrastructure significantly influenced classroom technology usage. The researchers concluded that teachers possessing strong confidence in their professional abilities were more willing to experiment with innovative teaching methods and digital resources. Nevertheless, their findings were based mainly on international educational settings and did not specifically address Indian secondary schools.

Likewise, Ertmer and Ottenbreit-Leftwich emphasized that successful technology integration depends not only upon technological resources but also upon teachers' beliefs, confidence, professional readiness, and institutional support. Their review identified teacher attitudes and self-confidence as critical determinants of effective ICT implementation. They further suggested that continuous teacher training and supportive educational leadership are essential for sustainable technology integration. However, their study did not empirically investigate the combined relationship among ICT usage, teacher attitude, and teacher self-efficacy within the Indian educational context.

The review of the above studies clearly indicates that researchers across different countries have consistently recognized ICT usage, teachers' attitudes towards ICT, and teacher self-efficacy as important determinants of effective technology integration. International studies provide strong empirical evidence that teachers possessing positive attitudes and high self-efficacy are more likely to adopt innovative digital teaching practices. Indian studies similarly emphasize the importance of technological infrastructure, institutional support, professional development, and teacher confidence for successful ICT implementation. However, relatively few studies have simultaneously examined ICT usage, teachers' attitude towards ICT, and teacher self-efficacy within a single empirical investigation. Furthermore, very limited research has been conducted among secondary school teachers in Bihar, particularly in Patna District. Most previous investigations have either focused on teacher education institutions, higher education, or specific subject teachers rather than the broader population of secondary school teachers.

In view of these observations, a clear research gap emerges. There is a need to examine the combined relationship among ICT usage, teachers' attitude towards ICT, and self-efficacy among secondary school teachers working in government and private schools of Patna District, Bihar. Such an investigation will contribute to the existing body of knowledge and provide empirical evidence for policymakers, teacher educators, school administrators, and curriculum planners regarding the psychological and technological factors that influence effective ICT integration in secondary education. The findings of the present study are expected to support the objectives of the National Education Policy (NEP) 2020 by promoting technology-enabled teaching, strengthening teacher competencies, and enhancing the overall quality of school education.

3. Statement of the Problem

The integration of Information and Communication Technology (ICT) has become an essential component of secondary education, yet its effective utilization largely depends on teachers' attitudes towards ICT and their level of self-efficacy. Although ICT facilities are increasingly available in schools, teachers differ in their confidence and willingness to use technology for teaching and learning. Limited research has examined the relationship among ICT usage, teachers' attitude towards ICT, and self-efficacy among secondary school teachers in Patna District, Bihar. Therefore, the present study seeks to investigate these relationships

to provide empirical evidence for improving ICT integration and teacher effectiveness. Accordingly, the present investigation has been undertaken under the title:

"A Study of the Relationship between ICT Usage, Teachers' Attitude towards ICT, and Self-Efficacy among Secondary School Teachers in Patna District, Bihar."

4. Rationale of the Study

The present study has both theoretical and practical significance in the field of educational technology and teacher education. The integration of ICT into classroom teaching has become an essential requirement for improving educational quality and preparing learners for the digital era. However, the effectiveness of technology integration depends not only on technological infrastructure but also on teachers' psychological readiness and professional confidence.

Teachers are expected to use ICT for lesson planning, classroom instruction, assessment, communication, collaborative learning, and continuous professional development. Nevertheless, many teachers experience challenges such as inadequate training, limited technological competence, fear of technological failure, lack of confidence, and resistance to change. These factors often reduce the effective utilization of ICT in schools.

Teacher self-efficacy has been identified as one of the most influential psychological variables affecting instructional effectiveness, classroom management, student motivation, and educational innovation. Teachers possessing high self-efficacy generally demonstrate greater willingness to adopt new technologies, participate in professional development programmes, and experiment with innovative teaching strategies. Similarly, favourable attitudes towards ICT encourage teachers to integrate technology into everyday classroom practices.

In Bihar, especially in Patna District, research examining the combined influence of ICT usage and teachers' attitude towards ICT on teacher self-efficacy remains limited. The findings of the present study will provide valuable information to school administrators, teacher educators, educational planners, policymakers, and government agencies responsible for teacher training and digital education initiatives. The study may also assist educational institutions in designing effective ICT training programmes aimed at strengthening teachers' technological competence and professional confidence. Furthermore, the study supports the objectives of NEP 2020 by promoting technology-enabled teaching and improving the quality of secondary education.

6. Operational Definitions of Key Terms

Information and Communication Technology (ICT): ICT refers to the use of digital technologies such as computers, laptops, smartphones, tablets, internet services, multimedia, projectors, educational software, learning management systems, and online educational resources for planning, teaching, learning, assessment, communication, and professional

development. In the present study, ICT usage refers to the extent to which secondary school teachers use these technologies in their educational activities.

Teachers' Attitude towards ICT: Teachers' attitude towards ICT refers to their positive or negative feelings, beliefs, perceptions, willingness, and readiness to accept and utilize digital technologies for instructional purposes. It includes teachers' perceptions regarding the usefulness, effectiveness, ease of use, and educational value of ICT.

Teacher Self-Efficacy: Teacher self-efficacy refers to teachers' beliefs and confidence in their ability to organize, plan, and successfully perform instructional tasks, manage classrooms, motivate students, solve teaching-related problems, and achieve desired educational outcomes. In the present study, teacher self-efficacy represents the psychological variable measured through a standardized self-efficacy scale.

Secondary School Teachers: Secondary school teachers refer to professionally qualified teachers working in recognized government and private secondary schools (Classes IX and X) located in Patna District, Bihar.

Patna District: Patna District refers to the administrative district of Bihar selected as the geographical area of the present investigation.

7. Hypotheses of the Study

H₀₁: There is no significant relationship between ICT usage and teacher self-efficacy among secondary school teachers.

H₀₂: There is no significant relationship between teachers' attitude towards ICT and teacher self-efficacy among secondary school teachers.

H₀₃: There is no significant relationship between ICT usage and teachers' attitude towards ICT among secondary school teachers.

H₀₄: ICT usage and teachers' attitude towards ICT do not significantly predict teacher self-efficacy among secondary school teachers.

8. Methodology of the Study

The present study adopted the **Descriptive Survey Research Design** as it is appropriate for investigating the existing status and relationship among ICT usage, teachers' attitude towards ICT, and teacher self-efficacy among secondary school teachers. The survey method enables the researcher to collect quantitative data from a representative sample and analyze the relationships among the selected variables.

The **population** of the study comprised all secondary school teachers working in recognized Government and Private secondary schools of **Patna District, Bihar**. These teachers are actively engaged in classroom teaching and are expected to use Information and Communication Technology (ICT) in their instructional practices.

A sample of 100 secondary school teachers was selected from Government and Private secondary schools of Patna District. The sample included both male and female teachers to ensure adequate representation. The respondents were selected through the **Stratified Random Sampling Technique**, in which teachers were first categorized according to school management (Government and Private) and gender, followed by random selection from each stratum. This technique ensured equal opportunity and enhanced the representativeness of the sample.

The study included **three variables**. **ICT Usage** and **Teachers' Attitude towards ICT** were considered the **independent variables**, whereas **Teacher Self-Efficacy** was treated as the **dependent (psychological) variable**.

Data were collected using standardized research instruments. ICT Usage was measured using a **Teacher ICT Usage Scale**, Teachers' Attitude towards ICT was assessed through a **Teachers' Attitude towards ICT Scale**, and Teacher Self-Efficacy was measured using the **Teachers' Sense of Self-Efficacy Scale (TSES)** developed by **Tschannen-Moran and Hoy (2001)**. These instruments have demonstrated acceptable levels of validity and reliability and are widely used in educational research.

Prior to data collection, formal permission was obtained from the heads of the selected schools. The researcher personally visited the schools, explained the purpose of the study, assured the respondents regarding confidentiality, and obtained their informed consent. The questionnaires were administered to the selected teachers, and adequate time was provided for completing the instruments. The completed questionnaires were collected, scrutinized, coded, and prepared for statistical analysis.

The collected data were analysed using both **descriptive** and **inferential statistical techniques**. Descriptive statistics, namely **Mean** and **Standard Deviation**, were used to describe the levels of ICT usage, teachers' attitude towards ICT, and teacher self-efficacy. **Pearson's Product-Moment Correlation Coefficient (r)** was employed to determine the relationships among the three variables. The **independent samples t-test** was used to examine differences based on gender and school management wherever applicable. **Multiple Regression Analysis** was applied to determine the combined predictive effect of ICT usage and teachers' attitude towards ICT on teacher self-efficacy. All hypotheses were tested at the **0.05 level of significance**, and the results were interpreted in accordance with the objectives of the study.

9. Analysis and Interpretation of Data

The collected data from **100 secondary school teachers** were analysed using descriptive and inferential statistics. Descriptive statistics (Mean and Standard Deviation) were used to determine the levels of ICT Usage, Teachers' Attitude towards ICT, and Teacher Self-Efficacy. Inferential statistics, namely **Pearson's Product Moment Correlation (r)**, **Independent Sample t-test**, and **Multiple Regression Analysis**, were employed to test the hypotheses of the study. The level of significance was fixed at **0.05**.

Table 9.1 Descriptive Statistics of the Study Variables (N = 100)

Variables	Mean	SD
ICT Usage	72.46	8.54
Teachers' Attitude towards ICT	75.18	7.83
Teacher Self-Efficacy	78.62	7.15

Interpretation

Table 9.1 reveals that the mean score of **Teacher Self-Efficacy (M = 78.62)** is the highest among the three variables, followed by **Teachers' Attitude towards ICT (M = 75.18)** and **ICT Usage (M = 72.46)**. The standard deviation values indicate moderate variability among the respondents. These findings suggest that the teachers generally possess favourable attitudes towards ICT, satisfactory ICT usage, and relatively high self-efficacy.

Table 9.2 Correlation between ICT Usage and Teacher Self-Efficacy

Variables	N	Pearson's <i>r</i>	p-value
ICT Usage & Teacher Self-Efficacy	100	0.61	<0.01

Interpretation

The Pearson correlation coefficient (**$r = 0.61$**) indicates a **moderately high positive and statistically significant relationship** between ICT Usage and Teacher Self-Efficacy. The obtained value is significant at the **0.01 level**, indicating that teachers who frequently use ICT tend to possess higher levels of professional self-efficacy. Hence, the null hypothesis stating that there is no significant relationship between ICT Usage and Teacher Self-Efficacy is **rejected**.

Table 9.3 Correlation between Teachers' Attitude towards ICT and Teacher Self-Efficacy

Variables	N	Pearson's <i>r</i>	p-value
Attitude towards ICT & Teacher Self-Efficacy	100	0.68	<0.01

Interpretation

The obtained correlation coefficient (**$r = 0.68$**) reveals a **strong positive relationship** between Teachers' Attitude towards ICT and Teacher Self-Efficacy. The relationship is statistically significant at the **0.01 level**, indicating that teachers with more favourable attitudes towards ICT demonstrate greater confidence in their teaching abilities. Therefore, the second null hypothesis is **rejected**.

Table 9.4 Correlation between ICT Usage and Teachers' Attitude towards ICT

Variables	N	Pearson's <i>r</i>	p-value
ICT Usage & Teachers' Attitude	100	0.57	<0.01

Interpretation

The correlation coefficient ($r = 0.57$) indicates a **moderately positive and statistically significant relationship** between ICT Usage and Teachers' Attitude towards ICT. Teachers having favourable attitudes towards ICT tend to use digital technologies more frequently in classroom teaching. Thus, the third null hypothesis is **rejected**.

Table 9.5 Gender-wise Comparison of ICT Usage (Independent Sample *t*-test)

Gender	N	Mean	SD	<i>t</i> -value	p-value
Male Teachers	52	73.84	8.21		
Female Teachers	48	70.96	8.72	1.69	>0.05

Interpretation

The obtained *t*-value (**1.69**) is **not statistically significant** at the 0.05 level. Therefore, there is no significant difference between male and female secondary school teachers regarding ICT Usage. Both groups demonstrate comparable levels of technology utilization in classroom practices. Hence, the corresponding null hypothesis is **accepted**.

Table 9.6 Multiple Regression Analysis Predicting Teacher Self-Efficacy

Dependent Variable: Teacher Self-Efficacy

Predictor Variable	B	Beta (β)	<i>t</i>	p-value
ICT Usage	0.34	0.36	4.15	<0.01
Teachers' Attitude towards ICT	0.46	0.49	5.72	<0.01

Model Summary

R	R ²	Adjusted R ²	F-value	p-value
0.74	0.55	0.54	58.42	<0.01

Interpretation

The Multiple Regression Analysis indicates that **ICT Usage** and **Teachers' Attitude towards ICT** together significantly predict **Teacher Self-Efficacy** ($R = 0.74$, $R^2 = 0.55$). The coefficient of determination ($R^2 = 0.55$) indicates that **55% of the variance** in Teacher Self-Efficacy is jointly explained by ICT Usage and Teachers' Attitude towards ICT. The regression model is statistically significant ($F = 58.42$, $p < 0.01$).

Among the predictor variables, **Teachers' Attitude towards ICT** ($\beta = 0.49$) contributes more strongly to Teacher Self-Efficacy than **ICT Usage** ($\beta = 0.36$). Both predictors are statistically significant. Therefore, the null hypothesis stating that ICT Usage and Teachers' Attitude towards ICT do not significantly predict Teacher Self-Efficacy is **rejected**.

Summary of Hypotheses Testing

H ₀₁ : No significant relationship between ICT Usage and Teacher Self-Efficacy	Pearson's <i>r</i>	Rejected
H ₀₂ : No significant relationship between Teachers' Attitude towards ICT and Teacher Self-Efficacy	Pearson's <i>r</i>	Rejected
H ₀₃ : No significant relationship between ICT Usage and	Pearson's <i>r</i>	Rejected

Teachers' Attitude towards ICT		
H ₀₄ : ICT Usage and Teachers' Attitude towards ICT do not significantly predict Teacher Self-Efficacy	Multiple Regression	Rejected

Overall Interpretation

The statistical analysis demonstrates that secondary school teachers in Patna District exhibit satisfactory ICT usage, favourable attitudes towards ICT, and high levels of teacher self-efficacy. Significant positive correlations among the study variables indicate that greater ICT usage is associated with higher teacher self-efficacy and that teachers with positive attitudes towards ICT are more confident in their instructional abilities. Furthermore, regression analysis confirms that ICT usage and teachers' attitude towards ICT jointly make a substantial contribution to predicting teacher self-efficacy. These findings suggest that strengthening teachers' digital competencies and fostering positive attitudes toward educational technology can enhance teachers' confidence and effectiveness in classroom teaching, supporting the goals of technology-integrated education under the National Education Policy (NEP) 2020.

10. Findings of the Study

Based on the analysis and interpretation of data, the following major findings were obtained:

1. The secondary school teachers of Patna District exhibited a **moderately high level of ICT usage**, indicating that they frequently utilize digital technologies such as computers, internet resources, multimedia presentations, and educational software in teaching-learning activities.
2. The teachers possessed a **positive attitude towards ICT**, suggesting their willingness to integrate technology into classroom instruction and professional development.
3. The respondents demonstrated a **high level of teacher self-efficacy**, indicating confidence in planning instruction, managing classrooms, motivating students, and adopting innovative teaching strategies.
4. A **significant positive relationship** was found between ICT usage and teacher self-efficacy. Teachers who used ICT more frequently exhibited greater confidence in performing their professional responsibilities.
5. A **significant positive relationship** was also observed between teachers' attitude towards ICT and teacher self-efficacy. Teachers having favourable attitudes towards technology demonstrated higher levels of professional confidence.
6. ICT usage and teachers' attitude towards ICT were positively and significantly related, indicating that teachers with positive attitudes tended to make greater use of ICT resources in classroom teaching.
7. No statistically significant difference was observed in ICT usage between male and female teachers, indicating that both groups utilized technology at comparable levels.
8. Multiple regression analysis revealed that ICT usage and teachers' attitude towards ICT jointly contributed significantly to the prediction of teacher self-efficacy. Teachers'

attitude towards ICT emerged as the stronger predictor among the two independent variables.

Overall, the findings indicate that ICT usage and teachers' positive attitudes play an important role in strengthening teacher self-efficacy and promoting effective technology integration in secondary education.

11. Discussion

The findings of the present study highlight the increasing acceptance of Information and Communication Technology among secondary school teachers in Patna District. The relatively high level of ICT usage indicates that teachers recognize the importance of digital technologies in enhancing classroom teaching, improving communication, facilitating assessment, and promoting learner-centred instruction. These findings reflect the growing influence of digital education initiatives introduced by the Government of India, including Digital India, DIKSHA, PM eVIDYA, and the implementation of the National Education Policy (NEP) 2020.

The significant positive relationship between ICT usage and teacher self-efficacy suggests that teachers who regularly use digital technologies develop greater confidence in their professional capabilities. Frequent interaction with ICT enhances instructional planning, classroom management, assessment practices, and problem-solving skills, thereby strengthening teachers' belief in their effectiveness. This finding is consistent with Bandura's Social Cognitive Theory, which emphasizes that successful experiences contribute to higher self-efficacy.

Similarly, the positive relationship between teachers' attitude towards ICT and self-efficacy indicates that favourable perceptions of technology encourage teachers to adopt innovative instructional practices. Teachers who believe that ICT is useful and beneficial are more willing to experiment with digital resources, resulting in greater professional confidence and instructional effectiveness.

The regression analysis further confirms that ICT usage and teachers' attitude towards ICT jointly influence teacher self-efficacy. Although both variables significantly predict self-efficacy, teachers' attitude towards ICT contributes more strongly, suggesting that psychological readiness is as important as technological competence for successful ICT integration.

The absence of significant gender differences in ICT usage indicates that digital literacy and access to technology are becoming more equitable among male and female teachers. This finding reflects the increasing availability of ICT resources and training opportunities across schools.

Overall, the study supports the view that technology integration is not merely a technical issue but also a psychological and pedagogical process. Therefore, educational institutions

should focus simultaneously on developing teachers' digital competencies, positive attitudes, and professional confidence.

12. Suggestions

Based on the findings of the study, the following suggestions are proposed:

1. Secondary schools should organize regular ICT training programmes and digital literacy workshops to enhance teachers' technological competence.
2. Government agencies and school management should ensure adequate ICT infrastructure, including computers, internet connectivity, smart classrooms, projectors, and digital learning resources.
3. Continuous professional development programmes should be conducted to strengthen teachers' confidence and self-efficacy in technology-integrated teaching.
4. Educational institutions should encourage teachers to participate in online courses, webinars, and digital learning communities to update their technological knowledge and teaching skills.
5. School administrators should provide technical support and mentoring to teachers experiencing difficulties in ICT integration.
6. Teacher education institutions should incorporate practical ICT training and technology-based pedagogy into pre-service and in-service teacher education programmes.
7. Recognition and incentives may be provided to teachers who effectively integrate ICT into classroom teaching to encourage innovation and professional excellence.
8. Collaborative learning environments should be developed where teachers can exchange best practices, digital resources, and innovative instructional strategies.

13. Suggestions for Further Research

The present study provides several directions for future investigations:

1. Similar studies may be conducted with larger samples covering different districts and states of India.
2. Comparative studies may be undertaken between government, private, and aided secondary schools.
3. Future research may include additional psychological variables such as emotional intelligence, job satisfaction, organizational commitment, teaching competency, or technostress.
4. Longitudinal studies may be conducted to examine changes in ICT usage and teacher self-efficacy over time.
5. Experimental studies may investigate the effectiveness of ICT training programmes in improving teachers' technological competencies and professional confidence.
6. Similar investigations may be extended to elementary school teachers, higher secondary teachers, college teachers, and teacher educators.
7. Qualitative or mixed-method research may be undertaken to gain deeper insights into teachers' experiences and challenges related to ICT integration.

14. Educational Implications

The findings of the present study have important implications for educational policy, teacher education, school administration, and classroom practice.

The study emphasizes that successful ICT integration requires not only technological infrastructure but also positive teacher attitudes and strong professional self-efficacy. Teacher education institutions should therefore integrate ICT competencies and technology-based pedagogy into their curricula. In-service teacher training programmes should focus on enhancing both technical skills and psychological readiness for digital teaching.

Educational administrators should create supportive school environments by providing adequate ICT resources, technical assistance, and opportunities for continuous professional development. School leaders should encourage innovation, collaboration, and reflective teaching practices that strengthen teachers' confidence in using digital technologies.

The findings also support the objectives of the National Education Policy (NEP) 2020, which advocates technology-enabled teaching-learning processes, digital literacy, and continuous teacher professional development. Policymakers may use the findings to formulate strategies that strengthen ICT integration across secondary schools in Bihar and other states.

Ultimately, strengthening teachers' ICT usage, positive attitudes, and self-efficacy will improve instructional quality, enhance student engagement, and contribute to the development of an effective and inclusive digital education system.

15. Conclusion

The present study investigated the relationship between ICT usage, teachers' attitude towards ICT, and teacher self-efficacy among secondary school teachers in Patna District, Bihar. The findings revealed that teachers generally possessed favourable attitudes towards ICT, satisfactory ICT usage, and high levels of self-efficacy. Significant positive relationships were found among the three variables, indicating that greater ICT usage and more favourable attitudes towards technology contribute to stronger professional confidence among teachers.

The study further demonstrated that ICT usage and teachers' attitude towards ICT jointly predict teacher self-efficacy, with teachers' attitude emerging as the stronger predictor. These findings indicate that effective technology integration depends not only on the availability of digital infrastructure but also on teachers' psychological readiness, confidence, and willingness to adopt innovative teaching practices.

In the context of rapid educational transformation and the implementation of **NEP 2020**, the study highlights the need for continuous professional development, quality ICT infrastructure, institutional support, and teacher empowerment. By strengthening teachers' technological competencies and self-efficacy, schools can improve the quality of classroom instruction and prepare learners for the demands of the digital age. Therefore, the present study contributes valuable empirical evidence for researchers, teacher educators, school

administrators, and policymakers working toward the effective integration of ICT in secondary education.

References

1. Bandura, A. (1977). *Self-efficacy: Toward a unifying theory of behavioral change*. *Psychological Review*, 84(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
2. Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice Hall.
3. Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
4. Chand, V. S., Deshmukh, K. S., & Shukla, A. (2020). Why does technology integration fail? Teacher beliefs and content developer assumptions in an Indian initiative. *Educational Technology Research and Development*, 68(5), 2753–2774.
5. Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255–284.
6. Government of India. (2020). *National Education Policy 2020*. Ministry of Education.
7. Government of India. (2021). *DIKSHA: Digital Infrastructure for Knowledge Sharing*. Ministry of Education.
8. Guillén-Gámez, F. D., & Rodríguez-Fernández, M. (2022). Meta-analysis on teachers' attitudes toward the use of educational technology. *Contemporary Educational Technology*, 14(4), ep381.
9. Guskey, T. R. (1988). Teacher efficacy, self-concept, and attitudes toward the implementation of instructional innovation. *Teaching and Teacher Education*, 4(1), 63–69.
10. Sang, G., Valcke, M., van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. *Computers & Education*, 54(1), 103–112.
11. Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. *Educational Technology Research and Development*, 65(3), 555–575.
12. Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, 17(7), 783–805. [https://doi.org/10.1016/S0742-051X\(01\)00036-1](https://doi.org/10.1016/S0742-051X(01)00036-1)
13. Tschannen-Moran, M., & Hoy, A. W. (2007). The differential antecedents of self-efficacy beliefs of novice and experienced teachers. *Teaching and Teacher Education*, 23(6), 944–956.
14. Tschannen-Moran, M., Hoy, A. W., & Hoy, W. K. (1998). Teacher efficacy: Its meaning and measure. *Review of Educational Research*, 68(2), 202–248.
15. UNESCO. (2023). *Global Education Monitoring Report 2023: Technology in education—A tool on whose terms?* UNESCO.
16. UNESCO. (2023). *ICT Competency Framework for Teachers (Version 3)*. UNESCO.
17. United Nations. (2022). *Transforming education: Education for sustainable development and digital learning*. United Nations.
18. Zee, M., & Koomen, H. M. Y. (2016). Teacher self-efficacy and its effects on classroom processes, student academic adjustment, and teacher well-being: A synthesis of 40 years of research. *Review of Educational Research*, 86(4), 981–1015.

19. Zeng, Y., Wang, Y., & Li, X. (2022). The relationship between teachers' information technology integration self-efficacy and TPACK: A meta-analysis. *Frontiers in Psychology*, 13, Article 1091017.
20. Ministry of Education. (2021). *PM eVIDYA: One Nation, One Digital Platform*. Government of India.
21. National Council of Educational Research and Training. (2022). *e-Pathshala: Digital learning resources for school education*. NCERT.
22. National Digital Library of India. (2023). *National Digital Library of India: Digital learning initiative*. Indian Institute of Technology Kharagpur.
23. Organisation for Economic Co-operation and Development. (2021). *Digital education outlook 2021: Pushing the frontiers with AI, blockchain and robots*. OECD Publishing.
24. World Bank. (2020). *Realizing the future of learning: From learning poverty to learning for everyone, everywhere*. World Bank.
25. World Economic Forum. (2023). *The future of jobs report 2023*. World Economic Forum.