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Competencies of Special Education Teachers in the use of Information and Communication Technology Tools in Mainstream Setting

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ABSTRACT: *This study investigates the association between the demographic profile and perceived ICT competency levels of special education instructors in mainstream environments as well as evaluate their ICT competencies. Data were gathered from fifty special education instructors using a quantitative research approach by means of an established survey form. In four areas technology operation and concept, social and ethical, pedagogical, and professional the study assessed ICT capability. Results showed that while instructors had intermediate proficiency in pedagogical and technical ICT skills, they displayed great competency in ethical and social ICT use. Lower levels of competency in technology operation and professional ICT engagement point to a need for further instruction in fields such digital assessment tools, online collaboration, and troubleshooting. Age, gender, educational background, duration of service, and ICT ability were not significantly associated with ICT competency, according statistical research. But teaching style choice showed a strong correlation with ICT competency, implying that teachers who include ICT into their lessons show more skill. The study emphasizes the need of institutional support to improve ICT integration in special education, more access to professional development chances, and ongoing ICT training programs. Modern and blended teaching strategies help to raise teachers' digital competencies for inclusive education even further.*

Key words*: Digital literacy, ICT competency, Mainstream education, Pedagogical ICT skills, Special education teachers, Technology integration.*

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1. Introduction

The formation of Information and Communication Technology (ICT) in education has profoundly altered teaching and learning methodologies, especially in inclusive and mainstream environments (Thomas, 2022). Special education teachers are essential in providing that children with varied learning requirements obtain equitable educational opportunities using ICT tools (Starks & Reich, 2023). Flanagan and Shoffner (2021) assert that ICT technologies are essential for facilitating differentiated education, enhancing accessibility, and providing personalized learning experiences for students with impairments. The efficacy of ICT integration mostly relies on teachers' skills, attitudes, and readiness to employ these resources (Ertmer & Ottenbreit-Leftwich, 2020; Kyamko et al., 2024). Special education teachers must have a diverse set of technological, pedagogical, and content expertise to effectively integrate ICT in mainstream classrooms.

Notwithstanding the advantages of ICT in special education, numerous educators encounter obstacles in its adoption and implementation (Alanazy & Alrusaiyes, 2021). Studies demonstrate that although educators acknowledge the promise of ICT in assisting children with disabilities, insufficient training, inadequate resources, and a lack of institutional support frequently impede effective integration (Alenezi, 2021). Tondeur et al. (2018) assert that teachers' abilities in using ICT tools differ according to their professional development experiences, access to technical infrastructure, and general digital literacy. Special education instructors necessitate specialized training to effectively utilize assistive technologies, adaptive software, and interactive learning platforms tailored for various learners (Lai & Bower, 2019). In the absence of these competencies, ICT was inadequately utilized in inclusive classrooms.

Furthermore, the Technological Pedagogical Content Knowledge (TPACK) framework offers a valuable perspective for evaluating the competencies of special education instructors in integrating information and communication technology (ICT) (Koehler & Mishra, 2009). This paradigm underscores the convergence of technology, pedagogy, and subject knowledge, emphasizing the necessity for educators to cultivate proficiency in all three domains to enhance ICT utilization in many educational contexts. Schmidt et al. (2020) assert that educators possessing robust TPACK competencies are more proficient in incorporating ICT technologies to improve student engagement and learning outcomes. Special education teachers must proficiently utilize both regular ICT tools and assistive technologies designed for pupils with impairments.

An essential component of ICT integration in special education is the implementation of assistive technology to support students with various disabilities. Edyburn (2020) asserts that assistive technology, including screen readers, speech-to-text software, and augmentative communication devices, enable students with impairments to engage more actively in the learning process. Nonetheless, insufficient familiarity and training among educators frequently restrict the optimal use of these tools in conventional environments (Okolo & Diedrich, 2019). Special education teachers must cultivate competencies in both the use of these technology and their adaptation to address unique student requirements.

Educator attitudes and self-efficacy significantly influence the effective implementation of ICT in special education. Kurt, Telli, and Aksal (2021) discovered that educators with positive attitudes and confidence in utilizing ICT are more inclined to effectively use technology into their teaching methodologies. Nonetheless, educators with diminished confidence or adverse opinions regarding ICT may refrain from utilizing these resources, despite their availability. Professional development programs and ongoing training initiatives are crucial for improving teachers' self-efficacy and providing them with the requisite skills to effectively employ ICT in mainstream special education environments (Tondeur et al., 2018). The proficiency of special education instructors in ICT integration is essential for providing inclusive and equitable education for children with disabilities in mainstream environments. Although ICT technologies have significant promise for facilitating differentiated instruction and enhancing accessibility, their efficacy is contingent upon educators' expertise, training, and attitudes regarding technology use. Overcoming obstacles such as insufficient professional development, poor resources, and reluctance to accept technology is crucial for enhancing ICT competencies among special education instructors. Future study should concentrate on creating specialized training programs that improve educators' digital competencies and pedagogical proficiency in utilizing ICT technologies to assist different learners.

Table 1. Age and Gender of the Respondents.

Age (in years)	Female		Male		Total	
	f	%	f	%	f	%
56 and above	f	%	f	%	f	%
51 – 55	1	2.00	0	0.00	1	2.00
46 – 50	1	2.00	1	2.00	2	4.00
41 – 45	2	4.00	0	0.00	2	4.00
36 – 40	7	14.00	2	4.00	9	18.00
31 – 35	7	14.00	6	12.00	13	26.00
26 – 30	10	20.00	3	6.00	13	26.00
25 and below	5	10.00	2	4.00	7	14.00
Total	2	4.00	1	2.00	3	6.00

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2. Methodology

This study employed a quantitative research design to assess the competency level of special education teachers in using ICT tools in mainstream settings. The descriptive-correlational method was used to collect, analyze, and interpret data regarding the respondents' demographic profile, their perceived ICT competence across different domains, and the relationship between these variables. A structured survey questionnaire was the primary data collection tool, which included sections on age, gender, educational attainment, length of service, teaching style preference, ICT skills, and relevant training and seminars attended. The questionnaire also assessed ICT competency in four domains: Technology Operation and Concept, Social and Ethical, Pedagogical, and Professional. A stratified random sampling technique was used to select special education teachers from mainstream schools, ensuring a representative sample. Data were analyzed using descriptive statistics (mean, frequency, and percentage) to summarize the respondents' profiles and ICT competence levels, while inferential statistics (Pearson correlation and ANOVA) were used to determine the significance of relationships between demographic factors and ICT competence. The study was guided by the INPUT-PROCESS-OUTPUT (IPO) model, where input variables included teacher demographics and ICT competencies, the process involved data collection and statistical analysis, and the output was the identification of competency levels and challenges faced in ICT integration. Ethical considerations were observed, ensuring informed consent, confidentiality, and voluntary participation.

3. Results and Discussion

The table shows the age and gender distribution of the 50 special education teachers who participated in the study. The majority of the respondents are female (70%), while male respondents make up 30% of the total sample. The most common age groups are 36–40 years old (26%) and 31–35 years old (26%), indicating that many of the teachers are in their mid-career stages. A smaller percentage of teachers belong to the 41–45 age group (18%), followed by 26–30 years old (14%), showing a mix of both younger and more experienced educators. Fewer teachers are in the 46–50 age range (4%), 51–55 years old (4%), and 56 and above (2%), suggesting that older teachers are less represented in this study. Only 6% of respondents are 25 years old or younger, indicating that there are fewer early-career teachers in the sample. Overall, the data suggests that most special education teachers in this study are female and within the 31 to 40-year-old range, which may influence their level of familiarity and comfort with using ICT tools in teaching.

Table 2. Highest Educational Attainment of the Respondents.

Educational Attainment	f	%
Ph.D./Ed. D.	1	2.00
with Ph.D./Ed. D. units	1	2.00
MA/MS	6	12.00
with MA/MS units	32	64.00
Baccalaureate degree	10	20.00

The table presents the highest educational attainment of the 50 special education teachers surveyed. The majority of the respondents (64%) have earned master's degree units (MA/MS units) but have not yet completed their degrees. Additionally, 12% of respondents have fully completed their MA/MS degrees, indicating that a significant portion of the teachers have pursued advanced education beyond the undergraduate level. Meanwhile, 20% of the respondents hold only a baccalaureate degree, meaning they have not yet pursued further studies. A small percentage of the teachers have attained doctoral-level education, with 2% holding a Ph.D. or Ed.D. and another 2% currently taking doctoral-level courses. These findings suggest that most special education teachers in this study have engaged in graduate studies, which may contribute to their professional development and ability to integrate ICT tools effectively in mainstream education settings.

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Table 3. Length of service of the respondents.

Length of Service (in years)	f	%
26 and above	1	2.00
21- 25	1	2.00
16-20	1	2.00
15-Nov	8	16.00
10-Jun	19	38.00
5 and below	20	40.00
Total	50	100.00

The table presents the length of service of the 50 special education teachers who participated in the study. The majority of respondents (40%) have been teaching for five years or less, indicating that a large portion of the sample consists of early-career teachers. Additionally, 38% of teachers have 6 to 10 years of experience, showing that a significant number have gained moderate teaching experience. A smaller percentage (16%) have been in the profession for 11 to 15 years, while only 2% of respondents have served for 16 to 20 years, 21 to 25 years, or more than 26 years. This suggests that there are fewer veteran teachers in the sample, with the majority having less than 10 years of teaching experience. The predominance of younger teachers may have implications for ICT competency, as newer educators may be more adaptable to technology use in teaching compared to those with longer service years.

Table 4. Preference of Teaching Style.

Teaching Style	f	%
Both	41	82.00
modern w/the use of ICT	4	8.00
Traditional	5	10.00
Total	50	100.00

The table presents the teaching style preferences of the 50 special education teachers surveyed. The majority of respondents (82%) prefer a combination of both traditional and modern teaching styles, indicating a balanced approach to instruction that incorporates both conventional methods and ICT tools. Meanwhile, 8% of respondents exclusively prefer modern teaching with ICT, suggesting that only a small number of teachers fully embrace technology-driven instruction. On the other hand, 10% of respondents favor a traditional teaching style, which relies more on conventional methods such as lectures and printed materials. These results indicate that while most special education teachers acknowledge the value of ICT in teaching, many still prefer to blend it with traditional approaches rather than fully transitioning to digital-based instruction. This preference for a hybrid approach may reflect teachers' efforts to accommodate diverse learning needs in mainstream education settings.

Table 5. Skills to Handle ICT.

Skills to Handle ICT	f	%
High	17	34.00
Medium	31	62.00
Low	2	4.00
Total	50	100.00

The table presents the self-assessed ICT handling skills of the 50 special education teachers. The majority of respondents (62%) rated their ICT skills as medium, indicating that while they have a basic to moderate understanding of ICT tools, they may still require additional training and support to fully integrate technology into their teaching. Meanwhile, 34% of teachers consider their ICT skills to be high, suggesting that they are confident in their ability to use ICT tools effectively in instruction. Only 4% of respondents rated their ICT skills as low, meaning that very few teachers feel they have limited capability in handling technology. These findings suggest that most teachers have at least a functional level of ICT competence, but additional training

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and professional development opportunities could further enhance their ability to integrate technology into special education in a mainstream setting.

Table 6. Trainings and Seminars Attended.

Number of Relevant Trainings and Seminars Attended	f	%
4 to 6	6	12.00
1 to 3	44	88.00
Total	50	100.00

The table presents the number of relevant ICT-related trainings and seminars attended by the 50 special education teachers. The vast majority of respondents (88%) have attended only one to three relevant trainings or seminars, suggesting that most teachers have limited exposure to ICT-related professional development. Meanwhile, only 12% of respondents have attended four to six relevant trainings, indicating that a smaller group has received more extensive training in ICT integration. These findings suggest that while most teachers have had some form of ICT training, the frequency and depth of these training sessions may not be sufficient to develop a high level of competence in using ICT tools effectively in a mainstream education setting. This highlights the need for more training opportunities to enhance teachers' ICT skills and confidence in integrating technology into special education.

Table 7. Technology Operation and Concept.

S/N	Indicators	WM	SD	Verbal Description
1	Identify and define functions of the main components (monitor, system unit, keyboard)	3.30	0.76	Expert
2	Identify and define the functions of computer peripherals (i.e. printer, scanner, modem, digital camera, speaker, etc.)	3.44	0.64	Expert
3	Properly connect main components, configure peripherals, and install drivers when required.	3.02	0.71	Experienced
4	Configure computer settings of various software and hardware.	2.74	0.56	Experienced
5	Use online and offline help facilities for troubleshooting, maintenance, and update of applications	2.82	0.69	Experienced
6	Understand the basic functions of the operating system.	3.38	0.67	Expert
Aggregate Weighted Mean		3.12		Experienced
Aggregate Standard Deviation			0.67	

The table presents the respondents' self-assessed competency in Technology Operation and Concept, which refers to their ability to handle and manage ICT tools. The aggregate weighted mean (3.12) indicates that, overall, the teachers fall under the "Experienced" category, meaning they have a good working knowledge of ICT but may still require improvement in certain areas. Looking at specific indicators, the teachers rated themselves as "Expert" in identifying and defining the main components of a computer (3.30), identifying computer peripherals (3.44), and understanding basic operating system functions (3.38). These scores suggest that most teachers have a strong foundational knowledge of ICT components and their functions. However, the teachers rated themselves as only "Experienced" in more technical aspects, such as properly connecting components and configuring peripherals (3.02), configuring computer settings (2.74), and using troubleshooting and maintenance tools (2.82). These lower scores indicate that while teachers can handle basic computer operations, they may need additional training in more advanced ICT tasks, such as troubleshooting, configuring settings, and performing software maintenance. The standard deviation (0.67) suggests some variation in responses, meaning that while some teachers may be highly skilled in technology operation, others may struggle with certain aspects. These findings highlight the need for more professional

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development programs focusing on ICT troubleshooting, system configuration, and software management to enhance teachers' confidence and efficiency in using ICT tools in special education.

Table 8. Social and Ethical.

S/N	Indicators	WM	SD	Verbal Description
1	Understand the legal implication of Software Licenses and Fair Use.	3.80	0.49	Expert
2	Properly acknowledge sources used in own work	4.00	0.00	Expert
3	Advocate the responsible use of various technologies like computers, cell phones, etc	4.00	0.00	Expert
4	Show respect for privacy and cyber etiquette, phone etiquette, and similar use of technology	4.00	0.00	Expert
5	Demonstrate proper handling of computer devices and use of applications.	3.72	0.64	Expert
6	Promote and implement rules and regulations on proper usage of computers.	3.84	0.37	Expert
Aggregate Weighted Mean		3.89		Expert
Aggregate Standard Deviation			0.25	

The table presents the respondents' self-assessed competency in Social and Ethical aspects of ICT use, which includes understanding legal implications, responsible technology use, and proper digital etiquette. The aggregate weighted mean (3.89) indicates that the teachers fall under the "Expert" category, meaning they have a strong understanding and application of ethical ICT practices in education. All indicators received high ratings, with the highest scores (4.00) given to the ability to properly acknowledge sources, advocate responsible technology use, and show respect for privacy and cyber etiquette. These results suggest that teachers are highly aware of ethical standards when using technology, particularly in giving credit to sources and ensuring responsible behavior online and in communication. The indicator with the lowest rating, though still in the "Expert" category, is demonstrating proper handling of computer devices and applications (3.72). This suggests that while teachers are confident in ethical ICT practices, there may be some variation in their ability to physically manage ICT tools in a responsible manner. The standard deviation (0.25) is relatively low, meaning there is high consistency in responses, with most teachers sharing similar views on ICT ethics. These findings indicate that special education teachers strongly uphold ethical principles when integrating ICT into mainstream education, ensuring that technology is used responsibly, fairly, and in compliance with legal and professional guidelines.

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Table 9. Pedagogical.

S/N	Indicators	WM	SD	Verbal description
1	Encourage students to do data analysis, problem solving, decision making, and exchange of ideas.	3.60	0.61	Expert
2	Use appropriately slide presentations, videos, audio, and other media in the classroom.	3.56	0.61	Expert
3	Teach students to use various multimedia materials for the reports and class presentations	3.58	0.54	Expert
4	Use various synchronous and asynchronous communication tools (Email, chat, whiteboards, forum, blogs	3.54	0.65	Expert
5	Use emails, group sites, blogs, etc. for disseminating information directly to students, colleagues, and parents	3.06	0.71	Experienced
6	Explore the use of electronic assessment tools like online testing, submission of projects via email or online facilities.	3.24	0.85	Experienced
Aggregate Weighted Mean		3.43		Expert
Aggregate Standard Deviation			0.66	

The table presents the respondents' self-assessed competency in Pedagogical ICT use, which refers to how effectively teachers integrate technology into instruction to support student learning. The aggregate weighted mean (3.43) falls under the "Expert" category, indicating that most special education teachers are confident in using ICT tools to facilitate teaching and learning. The highest-rated indicators include encouraging students in data analysis, problem-solving, decision-making (3.60), using multimedia such as slides, videos, and audio in class (3.56), teaching students to create multimedia presentations (3.58), and utilizing synchronous and asynchronous communication tools (3.54). These ratings suggest that teachers are comfortable with integrating various digital resources and interactive technologies to enhance instruction. However, the indicators with the lowest ratings, though still within the "Experienced" category, are using digital platforms (emails, group sites, blogs) for information dissemination (3.06) and exploring electronic assessment tools such as online testing and digital project submissions (3.24). These results indicate that while teachers effectively use ICT for instruction, they may have less experience or confidence in fully utilizing digital communication tools and online assessment methods. The standard deviation (0.66) suggests some variation in responses, indicating that while some teachers are highly skilled in pedagogical ICT use, others may still need further training. These findings highlight that while special education teachers effectively incorporate multimedia and digital tools in teaching, there is room for improvement in leveraging ICT for communication and assessment purposes. Providing professional development in online learning platforms, digital assessments, and communication tools may further enhance ICT integration in mainstream special education settings.

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Table 10. Technology Professional.

S/N	Indicators	WM	SD	Verbal Description
1	Review new and existing software for education	3.00	0.93	Experienced
2	Recommend useful and credible website to colleagues.	3.12	0.77	Experienced
3	Conduct research on the use of technology in the classroom	2.56	0.79	Experienced
4	Follow online tutorials or online degree programs	2.82	0.80	Experienced
5	Actively participate in online forums and discussions	3.04	0.86	Experienced
6	Share lesson plans, worksheets, templates, and teaching materials through course websites.	2.98	0.84	Experienced
Aggregate Weighted Mean		2.92		Experienced
Aggregate Standard Deviation			0.83	

The table presents the respondents' self-assessed competency in Technology Professional ICT use, which refers to their ability to engage in professional development and collaboration through technology. The aggregate weighted mean (2.92) falls under the "Experienced" category, indicating that while teachers have a moderate level of engagement with professional ICT practices, there is room for improvement in actively utilizing technology for research, collaboration, and professional growth. Among the indicators, the highest-rated competencies include recommending useful and credible websites to colleagues (3.12), actively participating in online forums and discussions (3.04), and reviewing new and existing educational software (3.00). These results suggest that teachers are somewhat comfortable with exploring and sharing technology-related resources within their professional circles. However, the lowest-rated indicators include conducting research on technology use in the classroom (2.56), following online tutorials or degree programs (2.82), and sharing lesson plans or materials through course websites (2.98). These findings indicate that teachers may have limited engagement with research, professional development through online learning, and sharing of teaching resources through digital platforms. The standard deviation (0.83) suggests some variation in responses, meaning that while some teachers actively engage in professional ICT use, others may be less involved. These results highlight the need for stronger encouragement and training in using technology for research, collaboration, and professional development. Schools and educational institutions may benefit from offering more training programs, workshops, and incentives for teachers to actively participate in online learning, research on ICT integration, and resource-sharing platforms to enhance professional growth in mainstream special education.

Table 11. Demographic Profile and their Perceived level of ICT Competency.

Variables	χ^2 -value	p - value	Decision	Remarks
Age and ICT Competency	χ^2 =0.081	0.777	Accept Ho	Not Significant
Gender and ICT Competency	χ^2 =0.857	0.355	Accept Ho	Not Significant
Highest Educational Attainment and ICT Competency	χ^2 =0.625	0.732	Accept Ho	Not Significant
Length of Service and ICT Competency	χ^2 =1.365	0.505	Accept Ho	Not Significant
Preference of Teaching Style and ICT Competency	χ^2 =6.640	0.010	Reject Ho	Significant
Skills to Handle ICT and ICT Competency	χ^2 =2.228	0.136	Accept Ho	Not Significant

Note: *significant at p<0.05.

The table presents the statistical analysis of the relationship between the respondents' demographic profile and their perceived level of ICT competency. The study used a significance level of $p < 0.05$, meaning that if the p-value is less than 0.05, there is a significant relationship between the variables. The results show that age

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(p = 0.777), gender (p = 0.355), highest educational attainment (p = 0.732), length of service (p = 0.505), and ICT skills (p = 0.136) have no significant relationship with ICT competency. This indicates that factors such as age, gender, education level, years of teaching experience, and self-reported ICT skills do not strongly influence teachers' ICT competency. In other words, ICT competence is not necessarily determined by these demographic factors, suggesting that both newer and more experienced teachers, regardless of their education or gender, have similar levels of ICT competency. However, the results show that preference for teaching style (p = 0.010) has a significant relationship with ICT competency. This means that teachers who prefer modern or blended teaching styles (a mix of traditional and ICT-based teaching) tend to have higher ICT competency levels compared to those who prefer purely traditional teaching. This finding suggests that teachers who are open to incorporating ICT into their teaching approach are more likely to develop stronger ICT competencies, highlighting the importance of teachers' willingness to adopt technology in education. Overall, the findings suggest that personal teaching preferences play a more significant role in ICT competency than demographic factors. This implies that efforts to improve ICT competency should focus on promoting technology integration in teaching strategies rather than solely considering teachers' age, experience, or education level. Schools and training programs can encourage more ICT-based teaching practices to enhance teachers' confidence and skills in using digital tools in mainstream special education settings.

4. Conclusion

The study found that special education teachers in mainstream settings have moderate ICT competency, with strengths in social and ethical ICT use but areas for improvement in technology operation and professional ICT skills. Age, gender, education level, length of service, and ICT skills did not significantly impact ICT competency, but teaching style preference did teachers who use modern or blended approaches showed higher ICT proficiency. Limited training opportunities may contribute to skill gaps, highlighting the need for more targeted ICT training and professional development. To enhance ICT integration in special education, schools should encourage blended teaching methods, provide continuous training, and offer institutional support to strengthen teachers' digital skills.

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