ASSESSING ICT COMPETENCE AMONG SECONDARY-LEVEL TEACHERS IN KATHMANDU VALLEY

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Abstract

This study investigates the state of ICT integration in Kathmandu's school education system, particularly the ICT competency of secondary-level teachers. The research employed a quantitative methodology utilizing a close-ended questionnaire with 41 teachers from four community schools. The collected data was analyzed using t-tests and ANOVA through SPSS. Additionally, the qualitative insights from the interview complemented the research. The findings of the study reveal a moderate proficiency in ICT competency among secondary-level teachers, with the low competence observed in ICT knowledge and practice. This suggests that while teachers possess some basic ICT skills, they may not fully utilize ICT's potential in their teaching practices. Further, statistically significant relationship between age and ICT competency, with lower proficiency among older teachers, highlights a potential need for targeted training programs to address the skills gap. Regarding the qualitative aspects of ICT integration, a persistent reliance on traditional teaching methods despite the acknowledgment of ICT's potential was prevalent, particularly among the old teachers. This disconnect between awareness and implementation underscores the need for deeper pedagogical integration of ICT into the curriculum and teaching practices. Additionally, the research identifies gaps in policy and uneven training in ICT integration across schools, emphasizing the need for a more systematic and standardized approach to ICT adoption. Overall, the study provides valuable insights into the current state of ICT integration in the secondary education system in Kathmandu Valley and highlights the challenges and opportunities for enhancing ICT competency among secondary-level teachers. The findings offer practical recommendations for policymakers, school management, and individual teachers to promote effective ICT integration and elevate the quality of school education in Kathmandu.

Keywords : ICT integration, school education, ICT knowledge, ICT practice, Kathmandu's education system

1.1 Introduction

The advancement in Information and Communications Technology (ICT) has transformed the education system by increasing access to digital information, supporting student-centered learning, producing a creative and collaborative learning environment, offering more opportunities to develop critical thinking skills, improving teaching and learning quality, and supporting teaching (Fu, 2013). Nepal is no exception to this phenomenon, as the influence of ICT can be distinctly observed within its educational sector. ICT encompasses an array of computing and telecommunication technologies, including hardware, software, networks, and digital devices, which collectively shape the dynamics of modern educational landscapes (Moursund, 2005). The integration of ICT into education is far more than a technological trend; it has become a catalyst for pedagogical innovation, transforming traditional classrooms into dynamic, interactive, and student-centered learning environments. By leveraging ICT tools, educators can tap into a wealth of resources, diversify teaching methods, and tailor instruction to meet the unique needs and preferences of individual learners (UNESCO, 2023; Moursund, 2005). While the benefits of ICT integration in education are evident, its successful implementation faces numerous obstacles. Teachers, as key agents of change, play a central role in navigating these challenges and capitalizing on the opportunities presented by ICT.

Over the years, the government of Nepal has formulated policies to introduce and emphasize the importance of ICT in education, aligning the country's schooling practices with global standards (Rana et al., 2020). For example, the

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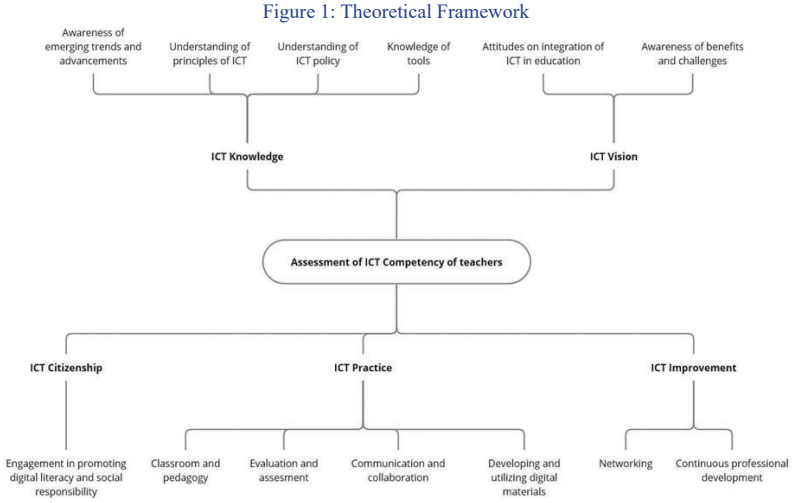
School Sector Development Plan 2016-2023 focused on the implication of ICT-based teaching-learning practice (MoE, 2016). It has listed the development of 4 major areas-strengthening communication in school administration through use of EMIS[3] , facilitating teaching-learning, the capacity building of stakeholders including teachers, and a separate discipline in the curriculum to enhance students' life skills. The expansion of internet infrastructures and internet access has increased the possibility of e-learning and has enabled school teachers to access the latest online information to facilitate rural school students' education (Dawadi & Shakya, 2016; Pangeni, 2016; Shields, 2011). Nonetheless, several circumstances affect the proper implementation of technology in classrooms such as poor infrastructure, lack of access to technological tools, effective professional development through training and workshops, low teacher self-efficacy, and teacher's perceptions towards ICT integration in pedagogical activities (Shrestha, 2022). Additionally, the effectiveness of government policies and plans has not been fully assessed and realized through research actions in different parameters or variables (Joshi et. al, 2021).

Successful integration of ICT into teaching and learning requires rethinking the role of teachers and reforming their preparation and professional development. As ICT transforms the learning environment from teacher-centered to student-centered (Chen et al., 2015 and Reid, 2002), there is a critical need to assess and improve educators' proficiency in incorporating ICT in education. However, the existing literature is found to be focused on the status of ICT infrastructure at school level and its integration in teaching learning activities, with less attention given to the competency of teachers to integrate ICT in such activities. Only a few studies, such as those by Joshi et al. (2021) on the ICT competency of mathematics teachers, Shahi (2022) on teachers' knowledge of ICT in ELT classrooms, and Thapaliya (2014) on perceptions and practices of ICT among English teachers, have specifically addressed the ICT competency teachers. Rana (2018) points out that teachers are unable to use ICT in the classroom as they have limited ICT training, limited internet connection, and poor infrastructure. Despite technology availability in urban areas like Kathmandu, research on teachers' ICT competency remains limited, thus leading to a specific focus on Kathmandu in this study. Notably, government initiatives like the School Sector Development Plan and the ICT Master Plan prioritize secondary schools and advocate for ICT integration in pedagogy within the secondary-level curriculum. Given this context, the study's primary objective was to assess the ICT competency of secondary-level teachers specifically in the Kathmandu Valley. The study focused on 5 aspects of ICT competency, namely ICT vision, knowledge, practice, improvement, and citizenship. Besides the research aimed to explore the statistical significance of independent variables such as gender, age, and teaching experience on the ICT competency. The findings from the research not only shed light on the current state of ICT competency among teachers in urban areas but also serve as a practical guide for policymakers, school administrators, and teacher trainers to enact targeted interventions, policies, and training programs that foster successful ICT integration in secondary-level education in Kathmandu.

1.2 Research Methods

The research is based on a theoretical framework derived from O.Spirin & O. Ovcharuk (2004), UNESCO ICT Competency Framework for Teachers, and Teaching Competencies developed by the National Center for Education Development (NCED). The integration of the teaching competencies by NCED was made to ensure that the competency framework is tailored to the specific needs and context of Nepal. The derived framework has five major components: ICT vision, knowledge, practice, improvement, and citizenship.

Figure 1: Theoretical Framework



The component ICT vision refers to the understanding of role and importance of ICT for work and lifelong learning. ICT Culture represents a worldview that embraces digital technologies for life and works in the information society. ICT Knowledge comprises theoretical knowledge related to ICT policy, principles, tools, emerging trends for learning, and practical activities. ICT Practice refers to the application of ICT knowledge and skills for personal, social, professional, and educational purposes. Similarly, ICT Improvement is the ability and attitude to use ICT tools for learning and professional development. Lastly, ICT Citizenship reflects awareness of responsible use of ICT for social interaction and behavior. These components are further divided into 13 sub-components to form a comprehensive framework that serves as the basis for evaluating and understanding ICT competency in the context of this study.

The research adopted a mixed methods approach, combining quantitative and qualitative methods. Four schools included in the Presidential Education Reform Program[4] in Kathmandu were selected randomly using the lottery method. The schools were selected exclusively from PREP, as this ensured the schools were actively engaged in ICT initiatives in their educational settings. The secondary-level teachers of the 4 schools were approached and invited to participate in the study through a structured questionnaire-based survey. Close-ended questionnaires on a 5-point Likert scale were designed to measure 5 pillars of ICT competency which were further divided into 13 subcomponents. In the study, ICT Competency and its component variables ICT Vision, ICT Knowledge, ICT Practice, ICT Improvement, and ICT Citizenship were the dependent variables, whereas gender, age group, and years of teaching experience were the independent variables. The collected data was analyzed using descriptive statistics: mean, median, and mode, and inferential statistical tests: t-tests and ANOVA. T-tests were employed to assess if there were statistically significant differences between two groups of gender, regarding ICT competency. ANOVA, on the other hand, also allowed for the examination of variations in ICT competency among different age groups or levels of teaching experience. Besides, interviews were conducted with the school's principal and experts working in ICT in education with schools and teachers to gather data related to participants' experiences, perceptions, challenges, and environment regarding ICT use in education. The collected qualitative data were analyzed using a descriptive analysis approach.

1.3 Results

1.3.1 Demographic background of the respondents

A total of 41 secondary-level teachers from four community schools in Kathmandu Valley took part in the survey. Of the respondents, 39% were female, 54% were male, and 7% had missing sex-related data. A majority, 39%, of respondents were aged 45-54, while 37% were 35-44. Teachers aged 25-34 constituted 17% of the cases, with 5% in the 55-65 age group. Cases with missing age data were negligible. The study included teachers from various subjects including Language, Mathematics, Science, Social, Accounting, and Computer. Experience levels varied, with 34% having 1-10 years, 32% with 11-20 years, 22% with 21-30 years, and 7% with 31-40 years of teaching experience. Approximately 5% had missing information regarding teaching experience.

1.3.2 Usage, Ownership, and Access

All 41 respondents reported usage of some form of ICT devices. Smartphones (100%) and computers (97.6%) are the most widely utilized ICT devices among the surveyed teachers in Kathmandu. Laptops and tablets showed slightly lower adoption, with 85.4% and 39% of the teachers using them. Similarly, all teachers reported owning personal devices suggesting their access to various ICT devices. Among the respondents, 56.1% owned a desktop computer, 75.6% owned a laptop, 97.6% owned a smartphone, and 24.4% owned tablets. Most teachers (95.1%) in the study reported having internet access at home, facilitating the use of online resources. However, only 65.9% had internet access at school, and a minority (12.2%) used cybercafes, possibly due to connectivity issues. Overall, the findings indicate that all teachers had access to ICT tools for educational integration.

1.3.3 Status of ICT Competency

The overall ICT competency of secondary-level teachers in the Kathmandu Valley was found to have a mean score of 3.2776, meaning that the ICT competency of the selected teachers is at moderate proficiency. The scores ranged from a minimum of 2.40 to a maximum of 4.09. The median score was slightly higher at 3.3801, indicating a slightly positively skewed distribution. The standard deviation of 0.45482 suggests a moderate level of dispersion in the data, indicating that there might be some variations in the levels of ICT competency among the teachers.

3. Educational Management Information System is an internet portal to drop & view education-related information mandated to all schools
4. Presidential Education Reform Program is a government initiative in Nepal, launched in FY 2022/23 that aims to enhance educational facilities through the establishment of ICT Labs, buildings, & digital libraries in selected schools all over Nepal.

Table 1: Descriptive Statistics of ICT Competency

	Overall ICT Competency	Competency 1: ICT Vision	Competency 2: ICT Knowledge	Competency 3: ICT Practice	Competency 4: ICT Improvement	Competency 5: ICT Citizenship
Mean	3.28	3.71	2.65	2.92	3.05	4.10
Median	3.38	3.73	2.73	2.99	3.12	4.00
Std. Deviation	.45	.47	.71	.67	.79	.38
Minimum	2.40	2.95	1.53	1.54	1.50	3.00
Maximum	4.09	4.70	3.95	4.00	4.13	5.00

ICT Vision

The first component, ICT vision, refers to the teachers' ability, attitudes, perceptions, and awareness towards the integration of ICT in education. The mean score for ICT vision was 3.71, with a minimum score of 2.95 and a maximum score of 4.70. The median score of 3.73 indicated a relatively symmetrical distribution, and the standard deviation of 0.47 suggests a moderate spread in the data. The survey findings reveal that teachers have a positive attitude towards ICT in education. For example, 32% strongly agreed, and 56% agreed that they integrate new ICT tools in teaching. Additionally, 100% of participants agree it's essential for teachers to stay updated on educational technology. Regarding ICT promotion, 51% strongly agree and 44% agree on its value in regular teaching. 44% strongly agree and 51% agree that ICT can be used to enhance communication and collaboration in learning. However, concerns exist, as 10% strongly agree and 46% agree that ICT increases their workload. The limited facilities and incentives as a teacher is found to impact their motivation in using ICT in teaching and learning activities with 5% strongly agreeing and 61% agreeing. Opinions on ICT's role in the timely completion of course syllabus varied. While 39% disagreed, and 32% strongly disagreed that using ICT made it harder to finish the syllabus on time, 17% agreed.

In the context of perceptions regarding the benefits and challenges of ICT in education, 41% strongly agreed and 51% agreed ICT enhances education quality. Similarly, 27% strongly agreed and 63% agreed that ICT improves classroom delivery. Participants acknowledge ICT's role in increasing access to resources with 27% strongly agreeing and 63% agreeing. Educators have a positive perception of ICT, with 22% strongly agreeing and 59% agreeing ICT is a valuable tool to improve educational governance. Additionally, 32% strongly agreed and 61% agreed ICT boosted their motivation in teaching. Conversely, some find ICT too technical or difficult to implement with 10% strongly agreeing and 51% agreeing. 20% of the respondents often encountered technical issues like connectivity problems, and hardware malfunctions when using ICT in education. Concerns about a digital divide affecting students' learning opportunities are expressed by 17% strongly agreeing and 56% agreeing. Some educators worry about technology overshadowing creativity and imagination, with 10% strongly agreeing and 44% agreeing.

ICT Knowledge

The second component, ICT knowledge, captures teachers' understanding of ICT tools, policy, principles, applications, and their proficiency in using technology for education. The mean ICT knowledge score was 2.65, ranging from 1.53 to 3.95. The median score of 2.73 indicates a slightly positively skewed distribution, with a notable standard deviation of 0.71, signifying variability in teachers' ICT knowledge levels. Proficiency levels varied across different tools. For Word Processors, 5% of teachers showed high proficiency, 24% advanced, 41% moderate, 24% basic, and 5% limited or no ability. For presentation software, 32% had advanced proficiency, 39% moderate, and 20% basic. 37% reported advanced and 44% reported moderate proficiency in search engines and web browsers. 5% had high proficiency, 34% advanced, 24% moderate, and 27% basic in Google Suites. Regarding social media proficiency, 22% reported high, 34% advanced, and 24% moderate. For AI tools, 24% had limited or no ability, 29% basic, 22% moderate, and 17% advanced proficiency. In Learning Management Systems, 24% were advanced, 27% moderate, 20% basic, and 17% had limited proficiency.

The findings reveal an alarming level of the unfamiliarity of ICT policies and frameworks among respondents. Only 12.5% made regular efforts to stay informed on ICT policy. 54% of respondents were not familiar at all and 7% were slightly familiar with ICT policy 2067. Regarding the ICT Master Plan, 49% were not familiar at all, 7% were slightly familiar, 19% neither, and 24% were familiar. The respondents were most familiar with the School Sector Reform Plan with 58% reporting to be familiar and 10% most familiar. Nonetheless, 17% were not familiar, 12% slightly familiar. Similarly, 54% were very familiar and 5% were extremely familiar with the School Sector Development Plan, with 22% reporting not familiar at all, 5% slightly familiar, and 12% moderately familiar. For Teaching Competencies by NCED 22% were not familiar at all, 7% were slightly familiar, 5% moderately familiar, and 51% very familiar. However, only 44% agreed they

could describe how the policy is implemented in their school and 54% agreed they could discuss its strengths and weaknesses. Concerning awareness of ICT principles , only 5% regularly stayed updated on it. A significant number of teachers reported unfamiliarity with ICT principle[5] frameworks. Concerning the International Society for Technology in Education (ISTE) standards, 49% of respondents were not familiar at all, 19% were slightly familiar, 17% were moderately familiar, and 15% were very familiar.

Regarding awareness of emerging ICT trends, the study found that respondents were familiar with Mobile Learning, with 68% being very familiar and 7% extremely familiar. Gamification, on the other hand, was less familiar to the respondents, with 27% indicating no familiarity at all, 12% slightly familiar, and 41% very familiar. Virtual reality (VR) and augmented reality (AR) technologies were also not widely known, with 34% indicating no familiarity at all, 12% slightly familiar, and 34% very familiar. This discrepancy in familiarity levels indicates that a considerable portion of teachers are not aware of such advanced technologies used in classroom practice. Regarding AI for personalized learning, 29% were not familiar at all, while 49% were very familiar with it, mostly on ChatGPT. Remote learning platforms were also quite familiar to the respondents, with 56% responding very familiar, only 5% being slightly familiar and 12% being not familiar at all. In terms of online collaborative tools, 76% of respondents were very familiar with them. These tools included Zoom, Microsoft Teams, and Google Meet. Lastly, online assessment tools were reported to be very familiar to 46% only.

ICT Practice

ICT practice refers to the implementation of ICT in classroom activities and educational practices. The mean ICT practice score was 2.92, ranging from 1.54 to 4.00. The median score of 2.99 highlights a slightly positively skewed distribution with a standard deviation of 0.67. Teachers' use of ICT in the classroom and pedagogical practice varied. 44% of teachers reported substantial usage (higher usage than moderate but not to a large extent) of Search engines and Learning Management systems, while 41% reported substantial usage of Digital resources and Web browsers. Although 34% of teachers reported substantial usage of presentation software and 27% reported multimedia projectors, only a few teachers extensively used these tools. For instance, 12% reported extensive use of search engines, 10% reported web browsers, 5% educational software, and 2% digital resources. Moderate usage was reported by 39% of respondents for learning management systems and multimedia projectors, 36% for presentation software, 32% for digital resources, 29% for educational Software related to subject content, and 24% for web browsers and search engines.

The study found that a considerable number of teachers utilized ICT tools in evaluation and assessment practices. In the context of recording grades, 27% reported substantial usage, 34% indicated moderate usage, 12% reported minimal usage, and 24% reported not utilizing ICT tools at all. Similar patterns emerge in the context of maintaining grades, with 24% reporting no usage of ICT tools and 32% reporting moderate usage. Regarding the use of ICT tools for taking attendance, 32% reported moderate usage and 29% indicated no usage at all. Similarly, 15% reported minimal usage, 27% substantial usage, and 5 % reported a large extent of ICT tools usage for providing assignments. Regarding the use of ICT tools in evaluating students 29% reported substantial usage, 22% reported moderate usage, 29% minimal usage, and 17% no usage at all. Regarding assigning tasks that require the use of ICT tools, 34% reported a moderate level of usage, 20% reported substantial usage, and 17% reported minimal usage.

In terms of communication and collaboration, the highest responses can be observed in the moderate usage of ICT. For instance, 51% of respondents reported using ICT moderately to communicate with students, 41% for conducting group activities, 51% to support students' learning, and 46% for collaborating with other schools and organizations. A smaller percentage of respondents made substantial use of ICT. Teachers employed video conferencing, Zoom meetings, Viber, group calls, PowerPoint presentations, audio, and visuals for group activities. Commonly used platforms included YouTube by 30.4% for learning support and Facebook/Messenger by 32.4% for student communication. Responses varied when it came to the preparation and use of digital resources. Only 5% of respondents extensively searched for subject content, 2% extensively prepared subject content using ICT, and 2% extensively printed handouts and lessons. This indicates a gap in the full utilization of ICT in developing and utilizing digital materials for educational purposes. For substantial usage, 44% searched for digital materials, 41% prepared subject content using ICT, 24% designed learning materials and activities, and 22% printed routines, lessons, and handouts. Digital materials created included PowerPoint slides, formula notes, handouts, quizzes, and downloaded pictures and videos.

3. In this study, ICT principles are frameworks & sets of standards designed to guide the integration of technology in education. For example: ISTE standards, UNESCO ICT CFT, TPACK, SAMR model

ICT Improvement

The fourth component, ICT improvement, assesses the teachers' willingness to enhance their ICT skills and adapt to technological advancements continuously. The mean score for ICT improvement was 3.05, with scores ranging from 1.50 to 4.13. The median score of 3.12 indicated a slightly positively skewed distribution, and the standard deviation of 0.79 suggested a relatively higher level of variation in the levels of ICT improvement among the teachers. While 41% teachers reported moderate usage of ICT tools to access online learning courses for their improvement, 15% reported not using ICT at all for this purpose, indicating potential resistance or barriers to online learning opportunities. A teacher specializing in computer subjects noted a lack of willingness among other subject teachers to learn about ICT. In terms of using digital resources to enhance school productivity, 37% reported substantial usage, indicating their active adoption of technology to streamline administrative tasks and boost overall school efficiency. However, 7% of them reported not using digital resources at all for this purpose. Regarding collaboration with outside experts, 44% reported moderate usage of ICT tools, reflecting a willingness to connect and learn beyond the school environment. Although there is still room for growth in fostering extensive collaboration with external professionals. Overall, the results suggest that secondary-level teachers in the Kathmandu Valley generally possess a moderate level of competency in ICT improvement, with some embracing advanced proficiency for professional development while others are still exploring technology tools.

ICT Citizenship

The fifth component, ICT citizenship, pertains to the perceived responsible and ethical use of technology in the educational setting. The mean score for ICT citizenship was relatively high at 4.10, with scores ranging from 3.00 to 5.00. The median score of 4.00 indicated a symmetrical distribution, and the standard deviation of 0.38 suggested a relatively low variation in the levels of ICT citizenship among the teachers. The respondents had positive attitudes regarding ICT citizenship. 76% agreed and 17% strongly agreed that they promoted responsible and ethical technology use in classrooms, reflecting a commitment to creating a safe digital environment. 27% agreed and 11% strongly agreed they were well- aware of internet threats such as cyberbullying, and online predators. Concerns about security and privacy in online platforms and student data are shared by 32% who strongly agreed and 61% who agreed. 76% agreed they provided guidance on recognizing internet threats.76% agreed, 15% strongly agreed they stayed updated on the latest internet threats and trends for effective student education, but 7% disagreed, suggesting a small portion may not be fully informed on the online threats. Overall, the findings indicate a generally high level of ICT Citizenship among secondary-level teachers in the Kathmandu Valley.

1.3.4. Age and ICT Competency

The ANOVA test confirmed a significant effect of age groups on ICT competency ($F=5.787$, $p=0.002$). With a p-value of 0.002 below the significance level 0.05 suggested a statistically significant relationship between age and secondary-level teachers' ICT competency. Post hoc tests (Tukey HSD) revealed that the mean score of age group 55-64 significantly differed from age groups 25-34, 35-44, and 45-54. However, no significant differences were observed in mean ICT competency scores among the 25-34, 35-44, and 45-54 age groups, indicating statistical similarity.

Table 3:ANOVA test between age group and ICT Competency (From SPSS)

ANOVA Tests

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.663	3	.888	5.787	.002

POST HOC TESTS

Age Group	Age Group	Sig.
55-65	25-34	.001
	35-44	.041
	45-54	.033

1.3.5 Sex and ICT Competency

The research examined the relationship between Sex and ICT competency using an independent sample t-test in the SPSS. The t-test yielded a non-significant result ($t=0.996$, $df=36$, $p=0.326$), in mean ICT competency scores between males ($M=3.3474$, $SD=0.48608$, $n=22$) and females ($M=3.1948$, $SD=0.43667$, $n=16$) groups, suggesting no significant difference in the mean ICT competency scores between males and females. It suggests that sex does not significantly influence ICT competency in the study sample.

Table 4: Independent Sample t-test of Sex and ICT Competency

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
ICT Competency	Equal variances assumed	.015	.903	.996	36	.326	.15260	.15315
	Equal variances not assumed			1.014	34.313	.318	.15260	.15052

1.3.6 Years of Teaching experience and ICT Competency

The relationship between teaching experience and ICT competency was analyzed using ANOVA in SPSS. Participants were grouped by teaching experience (1-10, 11-20, 21-30, and 31-40 years). Mean ICT competency scores varied across groups, with the 21-30 years group having the highest mean (M = 3.4376) and the 31-40 years group the lowest (M = 2.7996). ANOVA results (p = 0.043) indicated the ICT Competency of secondary-level teachers significantly differed according to their teaching experience. However, post hoc tests (Tukey's HSD) did not reveal specific pairwise differences, possibly influenced by factors like sample size or variance. Therefore, while teaching experience significantly influences ICT competency, specific group differences remain inconclusive.

Table 7: Results of ANOVA test between teaching experience and ICT Competency

ANOVA test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.552	3	.517	3.019	.043
Within Groups	5.997	35	.171		
Total	7.549	38			

1.3.7 Perspectives of school principals and NGO actors

The study interviewed a few school principals and NGO actors focusing on ICT in education to understand the current context of ICT integration in schools. Discussions with the principals revealed that infrastructure for ICT integration was present across all surveyed schools, including computer labs and some classrooms equipped with multiple interactive boards for grades 6-10. However, despite these infrastructures, not all teachers had the skill for the use of the devices. A school principal further added "It's difficult for older teachers (above 50) to learn new skills related to ICT. Even when they try to learn it's difficult for them to adapt to it." Similarly, he shared, that although a few teachers used projectors for classroom delivery, traditional teaching methods were still prevalent. On the administrative front, schools employed the IEMIS[6] software for attendance and student records, indicating some level of ICT utilization. Teachers expressed a willingness to learn advanced ICT tools but faced obstacles like perceived failure, busy schedules, and inadequate incentives.

Interviews with NGO representatives from Karkhana Samuha and Ole Nepal highlighted limited empirical research and the absence of a comprehensive policy framework for ICT integration, emphasizing unclear policy components and implementation methods. Another representative from Ole Nepal pointed out a broad-level policy lacking a practical definition. Progress in ICT adoption, such as ICT labs and e-libraries, was noted, but challenges included a lack of specific teacher training guidelines and inconsistent access to basic ICT training. Disparities in laptop access among teachers persisted, while efforts in selected municipalities were being made to address the issue. Despite having infrastructure, teachers often lacked awareness of integrating ICT into teaching routines, leading to continued traditional approaches due to unclear policies. Smartboard use faced challenges due to inadequate training, and investments were seen as stepping stones for future effective use. Teacher turnover and the introduction of less ICT-skilled educators posed obstacles. The pandemic, however, increased teachers' exposure to technology, resulting in improved ICT integration skills and capacity.

1.4 Discussion

The overall ICT competency score of 3.2776 indicates a slightly above moderate proficiency, suggesting a foundational understanding and practice of ICT among the sampled teachers. However, the nuances within the components of ICT competency reveal critical areas for improvement and shed light on the challenges educators

6.. Integrated Educational Management Information System (IEMIS) is an internet portal to drop & view education related information mandated to all schools

face in integrating technology into their teaching practices.

The study's findings show that teachers recognize the potential of ICT in enhancing the quality of education, showcasing a positive attitude towards its integration. However, concerns about increased workload and limited facilities and motivation highlight the need for a more nuanced understanding of the practical implementation of ICT in the classroom. This echoes Shahi's (2022) findings among secondary-level English teachers, where positive attitudes towards ICT use for educational purposes are found with obstacles like insufficient class time and inadequate training opportunities hindering effective integration. Recognizing these factors with comprehensive training programs can foster a supportive environment and bridge the gap between positive attitudes and effective implementation.

The teachers had the lowest competency in ICT knowledge, emphasizing a significant gap in familiarity with ICT policies, frameworks, and principles. The lack of awareness among teachers regarding existing policies indicates a disconnect between policymakers and educators, highlighting the need for clearer policy dissemination channels. This disconnection may have arisen from insufficient funding to resource infrastructures and adequately train teachers, as emphasized by Rana (2020) about effective government policy initiatives. The observed lack of awareness of ICT principles and frameworks further emphasizes the need for targeted initiatives to enhance teachers' knowledge and understanding of how ICT can be practically implemented in classroom activities. Teachers demonstrated awareness of commonly known tools like presentation software, word processors, and search engines alongside an awareness of emerging tools such as AI tools, specifically mentioning ChatGPT. Teachers expressed both curiosity and reluctance to learn more about this technology, citing concerns about their ability to grasp it.

Traditional teaching methods persist despite the acknowledgment of ICT potential, as indicated by the lower scores of ICT use in evaluation and assessment, communication and collaboration, classroom and pedagogy, and developing and utilizing digital materials. This resonates with the qualitative findings from interviews with school principals, where the prevalence of traditional teaching methods' effects on ICT integration was noted. While it's interesting to see Learning Management Systems like the Veda app being used in schools, teachers were not found to be aware of the government's learning e-portal. This highlights a significant gap in efforts to inform educators about government-led initiatives that could enhance the use of ICT in education. Further, it also indicates schools' willingness to adopt ICT in education when information and resources are accessible to them.

While the survey findings indicate substantial use of ICT for knowledge and skill improvement, interviews reveal reluctance among teachers to learn new things due to busy schedules and self-perceived skill inadequacy. This reluctance, coupled with limited collaborative platforms, impacts their competency in ICT improvement. The qualitative interviews echo these findings, emphasizing the challenges faced in fostering continuous professional development and creating an environment for collaborative learning. Such challenges among teachers have been highlighted by different literatures. Almekhlafi and Almeqdadi (2010), for instance, highlighted that teachers face challenges due to insufficient time for mastering new software and integrating ICT during class periods. Similarly, another literature highlights teachers' struggle with low software competence, limited ICT knowledge, inadequate pre-service training lack of incentives, and lack of clearly stated goals and expectations of ICT policies (Yilidirm, 2007). On a positive note, teachers expressed commitment to creating a safe digital environment, as reflected in their awareness of internet threats and efforts to guide students on recognizing these threats.

SPSS calculations revealed a statistically significant relationship between age and ICT competency, with older teachers facing challenges adapting to new skills. This finding is corroborated by qualitative interviews with principals, emphasizing the importance of tailoring support and training programs to address the unique needs of teachers at different career stages. The absence of a statistically significant relationship between gender and ICT competency indicates a commonality in vision, knowledge, and practices irrespective of gender. These findings are consistent with Marcial and de la Rama's (2015) and Joshi et al.'s (2021) study, where age was significantly linked to the level of ICT competency. Similarly, the results align with Joshi et al.'s (2021) research where sex made no significant difference. These alignments emphasize the robustness and reliability of the study's findings within the broader context of existing research in the field.

1.5 Conclusion

The advancement of ICT has significantly impacted education, offering avenues for improved teaching and learning through information access, communication, collaboration, and interactive experiences. To fully harness these benefits, teachers must possess the skills to integrate ICT effectively. This study assessed the ICT competency of secondary-level teachers in Kathmandu Valley, revealing a moderate overall competency level. Areas of lower competency include ICT knowledge, practice, and improvement, particularly among older teachers. While teachers generally have a positive attitude toward ICT integration, they lack the skills, especially among older age groups. The study identified a relationship between teachers' ICT competency and

age, years of teaching experience, and gender. Younger teachers (25-54) exhibited higher competency levels than older counterparts (55-64) and those with less experience. The study highlighted challenges, including insufficient training, inadequate infrastructure, and unclear integration guidelines.

The findings emphasize the need for a clear and comprehensive ICT integration policy that outlines specific components, objectives, and implementation strategies that should guide schools in effectively incorporating ICT tools and methods into the curriculum. It also highlights the role of school administrators in proper utilization and maintenance of existing ICT infrastructures such as computer labs, interactive boards, and internet connectivity. Besides, the study recommends school administrators to empower teachers through comprehensive training sessions for utilizing the existing technologies alongside peer learning and collaboration with each other. For Teacher Trainers, customizing ICT training programs based on teachers' specific needs and skill levels, focusing on areas like pedagogical ICT integration, tool proficiency, policy understanding, and principles through basic and advanced courses for comprehensive ICT mastery is needed. Lastly, there is a scope for comprehensive study focusing on specific areas where teachers' ICT competency is lacking, such as ICT knowledge, understanding ICT policy and curriculum, and ICT practice.

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