



Mapping Digital Skills: A Study of Teachers Digital Competence

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Abstract: The teaching-learning process is rapidly evolving in response to the constantly changing environment, with digital competence becoming increasingly important. The shift to online teaching, accelerated by the pandemic, allowed educators to experiment with new approaches in the classroom, fundamentally reshaping the education landscape. To ensure the effective and innovative use of information and communication technology (ICT) in teaching, school teachers need to develop digital competence, which encompasses knowledge, skills, and attitudes related to digital tools. The aim of this paper is to study the digital competence of school teachers with respect to their gender, subject taught, and teaching experience. The sample involves 982 school teachers teaching in primary, middle, and secondary levels from schools distributed across five districts of Bihar, India. The Teachers Digital Competence Test was administered to the sample, and the obtained data was analyzed using independent t-test (for gender) and one-way ANOVA. The findings of the study revealed that there is no significant difference in the digital competence of the school teachers with respect to gender. However, the findings show significant differences in the digital competence of school teachers with respect to the subject taught and their teaching experience.

Key Words: Digital Competence, Digital Skills, Online Teaching, Technology, School Teachers

"If we teach the way we did in the past, we deny our children the future they deserve."

John Dewey

INTRODUCTION

Education helps in the all-round development of the students, and the most important phase of an individual's life is the formative years, and the teacher plays the most key role during this stage. The school's effectiveness may impact what the child learns as a student. (Rajyam, 2014). Ilomaki et al. (2016) defined that digital competence encompasses technical skills, the ability to effectively use digital technologies for work, study, and daily life, the capacity to critically assess digital tools, and the engagement in and contribution to digital culture. The impact of digitalization is increasing evidently in all aspects of daily life, transforming how people interact, communicate, learn, and work (Schleicher, 2019). As a result, integrating digital education in schools has become an essential and logical response to the expanding influence of digitalization (Ala-Mukta, 2011). The COVID-19 pandemic brought about a lot of change in everyone's life, but students were affected the most as lockdowns prevented them from attending school. School management and teachers were ill equipped for online classes, and thus it became a big challenge to start this new mode of teaching learning with the help of technology. In Bihar, there are climatic conditions like extreme heat in the summers and extreme cold in the winters, due to which regular classroom teaching

is not possible. The school and the students are affected the most due to the closure of the school. If the teachers are digitally competent, they can conduct online classes, use technology in the day-to-day classroom teaching, and bring innovative methods, more creativity, and better interaction to their teaching and learning process. This can have a positive impact on the quality of school education. Cathy Burnett (2016) opines that digital information connects curriculum, pedagogy, and schools to promote children's emotional and social life. Teachers play the main part in the teaching learning process. Thus, they should be given proper training to learn digital abilities so they can use a blended learning approach for teaching. The rise and fall of quality education lies in the hands of the teacher, thus deciding the future of the country (Rajyam, 2014). In India, there are many policies and commissions that focus on the use of technology and digitalization in school education and teacher education programs. According to NCTE Regulation, teacher education courses have been revised, and ICT components are included. It is time to think about the digital competence skills of teachers so that a measurable step can be taken to bring about the desired change. It has become a challenge and demand for schools to form strategies to develop digital competence for providing better quality education and enhance the teaching learning process.

NEED OF THE STUDY

The optimal use of digital competency training requires an understanding of the key knowledge gaps in the teaching workforce. Different levels of digital competency within the school would justify a targeted strategy for different levels of remedial learning based on teachers' competency as well as the need for ICT application in the subjects they teach. Such insights could assist school administrators in effectively allocating resources. Accordingly, the research objectives of this paper are to assess teachers' digital competence with respect to three key teacher characteristics.

Research Objectives:

- 1) To study the significant differences in the Digital Competence of school teachers based on gender.
- 2) To study the significant differences in the Digital Competence of school teachers based on the subject taught.
- 3) To study the significant differences in the Digital Competence of school teachers based on the teaching experience.

Null Hypotheses:

- 1) There is no significant difference between the mean scores of Digital Competence of the school teachers based on their gender.
- 2) There is no significant difference between the mean scores of Digital Competence of the school teachers based on the subjects they teach.
- 3) There is no significant difference between the mean score of Digital Competence of the school teachers based on years of teaching experience.

RESEARCH METHODOLOGY

• Method:

The primary objective of the paper is to provide a single snapshot of the current digital competency of teachers by teacher's skills, role and demographics in Bihar, India. Accordingly, a Comparative Analysis method has been used in the present study. While this method does not allow for causal interpretation on the effects of digital competency on teaching outcomes or explore the drivers of teacher's digital competency, it provides a useful assessment of disparities and trends in teachers' digital skills.

• Population and Sample:

The population for this study were school teachers in 5 districts of Bihar (Patna, Gaya, Tirhut, Purnia and Bhagalpur). School teachers teaching at primary, middle and secondary levels from three types of schools: Private, Government and Missionary Schools constitute the population of the present study. Stratified random sampling approach has been used to select a total of 54 schools from across the 5 study districts.

To ensure sample balance across the key demographics of interest, the sample of teachers was stratified on Gender, Subjects Taught as well as Teacher Experience before the random selection of

respondents from a list of school teachers in each school. The final sample consists of 982 school teachers.

- **Research Tool:**

Digital Competence Test (DCT) for School Teachers constructed and validated by the investigator was used. This tool consists of 24 multiple choice questions based on digital knowledge and skills that school teachers should possess for integrating technology in the teaching learning process.

RESULTS AND DISCUSSION

Null Hypothesis 1: There is no significant difference between the mean score of digital competence of school teachers on the basis of gender.

Table 1: Difference in the digital competence of school teachers on the basis of gender

Digital competence	Gender	No	Mean	S.D	Std. error. Mean	t-ratio	Significant
	Female	624	15.32	4.663	.187	1.892	N.S
	Male	358	14.73	4.972	.263		

It is inferred from the above table 1, that there is no significant difference between female and male school teachers in their digital competence. Hence the null hypothesis is accepted.

Null Hypothesis 2: There is no significant difference between the mean score of digital competence of school teachers on the basis of subject taught.

Table 2: Difference in the digital competence of school teachers on the basis of subject taught

Subject Taught	No. of Teachers	Mean	S.D		
Language	296	14.58	4.711		
Maths/Sc/Comp	362	15.90	4.684		
SSt/Arts	324	14.72	4.860		
Total	982	15.11	4.784		
ANOVA					
Digital Competence	Sum of Square	Df	Mean Sq	F	Sig
B/W group	356.181	2	178.090	7.891	S
Between groups	22095.94	979	22.570		
Total	22452.12	981			
Post Hoc test					
Subject Taught		Mean. Difference	Std. Error	Sig	
Language	Maths/Sc/Comp	1.314	.372	.002	
	SSt./Arts	.135	.382	.939	
Maths/Sc/Comp	Language	1.314	.372	.002	
	SSt./Arts	1.179	.363	.005	
SSt./Arts	Language	.135	.382	.939	
	Maths/Sc/Comp	1.179	.363	.005	

It is inferred from the above table 2, the calculated f-ratio is 7.891 which is more than the table value at 0.05% level of significance. Hence the null hypothesis is not accepted. This suggests a significant difference in digital competence based on the subjects taught. Mathematics, science, and computer studies teachers

differ significantly having better digital competence compared to those teaching languages, social studies, and arts.

Null Hypothesis 3: There is no significant difference in the mean score of digital competence of school teachers on the basis of teaching experience.

Table 3: Difference in the digital competence of school teachers on the basis of teaching experience

Teaching Experience	No. of Teachers	Mean		S.D	
Below 5 years	261	15.81		4.097	
B/W 5-15 yrs	470	14.94		4.959	
Above 15 years	251	14.70		5.048	
Total	982	15.11		4.784	
ANOVA					
Digital Competence	Sum of Square	Df	Mean Sq	f	Sig
B/W group	184.521	2	92.261	4.056	S
Between groups	22267.60	979	22.745		
Total	22452.12	981			
Post Hoc Test					
Teaching Experience		Mean Difference		Std.Error	Sig
Below 5 years	B/W 5-15 yrs	.874		.368	.060
	Above 15 yrs	1.111		.422	.031
B/W 5-15 yrs	Below 5 yrs	.874		.368	.060
	Above 15 yrs	.237		.373	.817
Above 15 yrs	Below 5 yrs	1.111		.422	.031
	B/W 5-15 yrs	.237		.373	.817

It is inferred from the above table 3, the calculated f- value is 4.056, which is more than the table value at 0.05% level of significance. Hence the null hypothesis is not accepted. There is a significant difference in digital competence between teachers with less than 5 years of experience and those with over 15 years of experience. Teachers below 5 years of teaching experience possess better digital competence than teachers having more experience.

DISCUSSION & LIMITATIONS

The findings indicate no significant differences in digital competency by teacher gender. Young teachers and science and mathematics teachers had better digital competence. While the current research, in-depth qualitative research could further explore the reasons why teachers of Science/Mathematics & Computer studies courses tend to score higher on digital competency. For instance, this difference could be driven by selection (i.e. more digitally competent teachers systematically specialising in these courses); relevance (i.e. teachers of English/Literature subjects finding limited value add in learning digital skills) or possibly by factors related to teachers' access to resources to boost digital competency (i.e. additional remedial courses).

Furthermore, exploring how teachers' level of digital competency influence student outcomes would be critical to formulate more meaningful policy suggestions. In case the value-add on student learning of a Computer Science teacher' digital competency is larger than the teacher digital competency of in English, then closing the gap between the DCTT scores of all teaching staff would be inadvisable. At the same time, given additional potential risks of school closures (i.e. strikes, heatwaves or cold waves), adequate levels of digital competency of all teaching staff may contribute to the resilience of all students.

An additionally avenue for future research would be disentangling of potential confounding effects. For instance, while years of experience do not show significant associations with DCTT, a closer inspection could see how teachers' age interacts with experience, as younger teachers tend to have improved DCTT skills, which could explain the better scores of more "inexperienced" teachers. Similarly, given the different

resourcing levels of Government, Private and Missionary schools, disentangling associations by school type could reveal more meaningful relationships between the variables of interest.

CONCLUSION

The integration of digital skills and e-tools in daily teaching practices can significantly enhance students' understanding and learning outcomes. Teachers' digital competence is essential for effectively implementing ICT in the classroom on a regular basis. The current study aimed to assess the digital competence of school teachers in relation to gender, subject taught, and teaching experience. The findings revealed no significant difference in digital competence based on gender. However, there were notable differences in digital competence based on the subject taught and some around the teachers' level of experience. The teachers must be provided with more workshop, peer learning and regular updates focused on improving digital competency could be offered to teachers with more years of experience as well as teachers of focusing on Language and art subjects.

Therefore, today's teachers must not only be proficient in content and pedagogy but also in the use of technology for lesson preparation, delivery, and follow-up in the teaching-learning process. Thus, schools should actively encourage and equip teachers with e-tools to enhance the teaching-learning experience.

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