

International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open-access journal
Impact Factor 5.3 www.ijesh.com ISSN: 2250-3552

Relationship between Teachers' Digital Competence and Classroom Teaching Practices

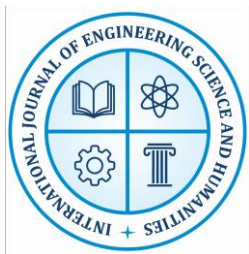
Ashu Jolly

Assistant Professor, Department of Education, Government College of Education, Jammu

Abstract

The growing presence of digital technologies in schools has made teachers' digital competence a central concern for education systems, yet the extent to which this competence is reflected in everyday classroom teaching remains insufficiently understood. The present study examined the relationship between teachers' digital competence and their classroom teaching practices among secondary and higher secondary school teachers. A descriptive correlational survey design was adopted, and data were collected from a sample of 120 teachers selected through stratified random sampling from government and private schools. Two self-developed and validated instruments were used: a Teachers' Digital Competence Scale (25 items, five dimensions) and a Classroom Teaching Practices Scale (20 items, four dimensions). Both instruments showed high internal consistency (Cronbach's $\alpha = .907$ and $.898$ respectively). Data were analysed in SPSS using descriptive statistics, Pearson's product-moment correlation, independent samples t-test, one-way ANOVA with Tukey post hoc comparisons, and multiple linear regression. The results showed that teachers possessed a moderate level of digital competence ($M = 3.43$, $SD = 0.51$) and a moderately high level of classroom teaching practices ($M = 3.57$, $SD = 0.50$). A strong, positive and significant correlation was found between digital competence and classroom teaching practices ($r = .676$, $p < .001$). No significant differences were observed by gender or type of school, whereas teaching experience produced significant differences in both digital competence and teaching practices, with less experienced teachers scoring higher. Multiple regression analysis revealed that the five dimensions of digital competence together explained 49.5% of the variance in classroom teaching practices, with digital pedagogy ($\beta = .423$) and digital safety and ethics ($\beta = .216$) emerging as significant predictors. The study concludes that pedagogically oriented digital competence, rather than technical skill alone, is most closely linked to quality classroom teaching, and it recommends professional development programmes that integrate technology with pedagogy.

Keywords: digital competence, classroom teaching practices, digital pedagogy, teacher professional development, ICT integration, secondary education



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1. Introduction

1.1 Digital Transformation in Contemporary Education

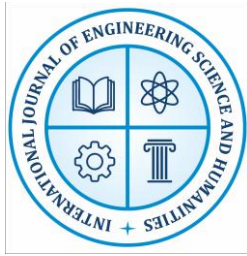
Education systems across the world are undergoing a profound transformation driven by the rapid spread of digital technologies. Computers, tablets, interactive boards, learning management systems and internet-based resources have moved from the margins of schooling to its centre, changing how knowledge is accessed, represented and shared. International assessments have shown that students now spend a considerable part of their learning time with digital devices, although access alone has not automatically produced better learning outcomes (OECD, 2015). The International Computer and Information Literacy Study similarly reported wide variation in students' ability to use computers to investigate, create and communicate, and it drew attention to the role of schools and teachers in developing these capabilities (Fraillon et al., 2014). These findings point to an important lesson: technology becomes educationally valuable only when it is purposefully integrated into teaching and learning by capable teachers.

In this context, schools are expected not only to equip classrooms with devices but also to prepare learners for a society in which digital skills are essential for further study, employment and citizenship. Policy documents in many countries now describe digital literacy as a basic skill alongside reading, writing and numeracy. Teachers therefore stand at the meeting point of two expectations: they must use technology to improve their own teaching, and they must help students become confident, critical and responsible users of technology. This dual responsibility has placed the digital competence of teachers firmly on the agenda of researchers, teacher educators and policy makers.

1.2 Concept of Teachers' Digital Competence

Digital competence is a broad and evolving concept. Ferrari (2013) described it as a set of knowledge, skills and attitudes needed to use digital technologies to perform tasks, solve problems, communicate, manage information, collaborate, and create and share content effectively, appropriately, critically, creatively and ethically. The DIGCOMP framework organised this competence into five areas: information, communication, content creation, safety and problem solving. Building on this general framework, Redecker (2017) proposed the European Framework for the Digital Competence of Educators (DigCompEdu), which recognises that teachers require a profession-specific form of digital competence that covers professional engagement, digital resources, teaching and learning, assessment, empowering learners and facilitating learners' digital competence.

For teachers, digital competence is therefore not the same as general computer skill. Krumsvik (2014) argued that teachers' professional digital competence involves the ability to use technology with good pedagogical and didactic judgement, together with an awareness of its implications for learning strategies and the formation of pupils. This view shifts attention from



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what teachers can do with a device to what they can do with a device in order to teach well. It also implies that digital competence develops over time through practice, reflection and professional learning, rather than being a fixed set of technical abilities.

1.3 Nature of Classroom Teaching Practices

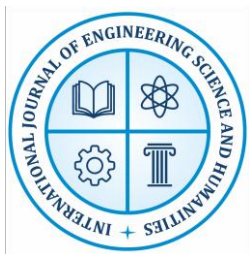
Classroom teaching practices refer to the concrete actions through which teachers plan lessons, present content, engage learners, manage classroom interaction, and assess and support learning. Effective practice typically involves clear planning aligned with learning goals, varied and well-structured instructional delivery, active participation of students, and regular assessment accompanied by useful feedback. These practices are shaped by teachers' knowledge, beliefs and working conditions. Petko (2012) showed that teachers' pedagogical orientations, together with their skills and access to tools, influence how and how often they use digital media in their classrooms.

Teaching practice is also where the quality of education is ultimately decided. Curricula, resources and technologies can only have an effect on learners through the everyday decisions that teachers make. For this reason, research that seeks to understand the educational value of technology must eventually ask how technology changes, supports or constrains what teachers actually do in their classrooms. Frameworks such as technological pedagogical content knowledge (TPACK) provide one way of describing how knowledge of technology, pedagogy and content come together in teaching (Voogt et al., 2013).

1.4 Linking Digital Competence with Teaching Practice

There are strong theoretical reasons to expect that teachers' digital competence and their classroom practices are related. Teachers who are competent in finding, adapting and creating digital resources are able to offer richer representations of content. Teachers who can use online tools for communication and collaboration can extend interaction beyond the classroom, and those who understand digital assessment tools can provide faster and more individualised feedback. Ertmer et al. (2012) demonstrated that teachers' beliefs and knowledge are closely tied to the ways in which they integrate technology, suggesting that competence and confidence influence classroom decisions.

At the same time, the relationship is not automatic. Several studies have noted that high levels of personal technology use do not always translate into pedagogically meaningful classroom use (Tondeur et al., 2017). Teachers may be skilled users of technology in their private lives while continuing to teach in traditional ways. It is therefore important to examine which aspects of digital competence are most closely associated with teaching practice, and whether the link is driven mainly by technical skill or by the pedagogical use of technology.



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1.5 Significance of the Present Study

Much of the available research on teachers' digital competence has been conducted in European and East Asian contexts and has often focused on pre-service teachers or on the frequency of technology use rather than on the quality of teaching practice. Comparatively fewer studies have examined in-service school teachers and linked specific dimensions of digital competence to specific dimensions of classroom practice. The present study addresses this gap by investigating the relationship between teachers' digital competence and classroom teaching practices among secondary and higher secondary school teachers, and by examining the role of gender, type of school and teaching experience.

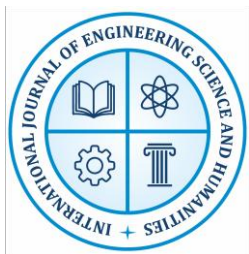
The findings are expected to be useful for several groups. For teacher educators, the study identifies which components of digital competence deserve greater emphasis in training. For school leaders, it offers evidence on how digital competence relates to the teaching quality they seek to promote. For policy makers, it provides empirical support for designing professional development that integrates technology with pedagogy rather than treating technical training in isolation.

2. Review of Literature

2.1 Frameworks and Models of Digital Competence

Research on digital competence has been strongly shaped by the development of conceptual frameworks. Ferrari (2013) provided one of the most influential general frameworks, identifying 21 competences across five areas and describing proficiency levels for each. This framework has served as a reference for curriculum design and self-assessment tools in many countries. Redecker (2017) extended this work specifically to educators, proposing 22 competences organised in six areas and a six-level progression model ranging from newcomer to pioneer. The DigCompEdu framework is notable for placing pedagogical competences, such as teaching, guidance, collaborative learning and assessment, at its core.

Alongside these frameworks, the TPACK model has been widely used to understand teachers' knowledge for technology integration. Voogt et al. (2013) reviewed 55 studies on TPACK and concluded that the framework is useful for describing the complex knowledge teachers need, while also noting that the boundaries between its components are not always clear. Chai, Koh and Tsai (2013) reviewed TPACK research and found that most studies relied on self-report surveys and that the construct was increasingly being linked to teachers' design of learning experiences. In Nordic research, Krumsvik (2014) proposed a model of teachers' professional digital competence that combines basic digital skills, didactic ICT competence, learning strategies and digital Bildung, highlighting the formative and ethical dimensions of technology use.



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Taken together, these frameworks share the view that teachers' digital competence is multidimensional. It includes technical literacy, the ability to create and manage digital content, communication and collaboration, awareness of safety and ethics, and above all the ability to use technology pedagogically. The present study draws on these frameworks in defining five dimensions of digital competence.

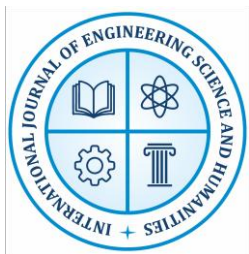
2.2 Development and Levels of Teachers' Digital Competence

A substantial body of research has examined how teachers acquire digital competence and at what level they currently operate. Røkenes and Krumsvik (2014) reviewed 42 studies on the development of student teachers' digital competence and found that modelling, collaborative learning, authentic tasks and reflection were important features of effective teacher education programmes. Instefjord and Munthe (2016) analysed teacher education curricula in Norway and reported that digital competence was often mentioned only in general terms and was weakly connected to subject teaching, which limited student teachers' opportunities to learn how to use technology in their future classrooms.

Studies of in-service teachers show a similar pattern of uneven development. Tondeur et al. (2017) developed and validated an instrument to measure pre-service teachers' ICT competencies and distinguished between competence in using ICT to support pupils' learning and competence in using ICT as a teacher. Hatlevik (2017) examined Norwegian teachers and found that teachers' self-efficacy in ICT and their strategies for evaluating information were positively related to their digital competence, which in turn was associated with their use of ICT at school. Research on student populations has also highlighted the importance of home background and school factors in shaping digital competence (Hatlevik & Christophersen, 2013), suggesting that teachers must often compensate for unequal digital opportunities among learners. Demographic factors have also been explored. Koh, Chai and Tsai (2014) found that teaching experience and gender were related to some TPACK constructs, with younger or less experienced teachers sometimes reporting higher technological knowledge. However, findings on gender and experience are inconsistent across contexts, and many authors argue that professional learning opportunities matter more than personal characteristics.

2.3 Digital Competence and Technology Integration in Classrooms

A central question in the literature is whether digital competence leads to meaningful classroom use of technology. Ertmer et al. (2012) studied teachers recognised for exemplary technology integration and found that their pedagogical beliefs, knowledge and confidence were the strongest enablers, while external barriers such as limited resources were less decisive. Kim et al. (2013) similarly reported that teachers' beliefs about the nature of knowledge and effective ways of teaching were related to their technology integration practices, and that these beliefs were difficult to change without sustained support.



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Scherer, Siddiq and Teo (2015) showed that teachers' perceived usefulness of ICT is a multidimensional construct and that perceptions of usefulness for teaching and learning were associated with actual classroom use. Siddiq, Scherer and Tondeur (2016) introduced the construct of teachers' emphasis on developing students' digital information and communication skills and found that this emphasis was linked to teachers' own ICT self-efficacy and to their use of ICT in instruction. Gil-Flores, Rodríguez-Santero and Torres-Gordillo (2017), using data from a large international survey, found that teachers' ICT skills and their participation in professional development were stronger predictors of classroom ICT use than school infrastructure alone.

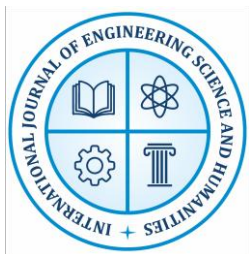
These studies suggest that digital competence is associated with how often and how well teachers use technology, but they tend to measure technology use rather than broader teaching practice. The question of whether digital competence is associated with the overall quality of planning, delivery, engagement and assessment has received less attention.

2.4 Digital Competence, Pedagogy and the Quality of Teaching

A growing number of researchers argue that the key issue is not whether teachers use technology, but whether its use improves teaching and learning. Petko (2012) found that teachers with constructivist orientations were more likely to use digital media in ways that supported student activity, and that skills and access were necessary but not sufficient conditions. Tondeur et al. (2017), in a systematic review of qualitative evidence, concluded that the relationship between pedagogical beliefs and technology use is bidirectional: beliefs shape technology use, and successful experiences with technology can gradually reshape beliefs and practice.

Large-scale studies support the view that pedagogical integration matters more than quantity of use. The OECD (2015) reported that students who used computers moderately at school tended to perform better than those who used them rarely or very frequently, suggesting that the quality of teachers' pedagogical decisions determines the value of technology. Fraillon et al. (2014) found that teachers who were confident in using ICT were more likely to emphasise the development of students' information and communication skills. Voogt et al. (2013) likewise emphasised that TPACK should be understood as knowledge in action that is visible in the design and enactment of lessons.

Overall, the literature establishes that teachers' digital competence is multidimensional, that it develops through training and practice, and that it is associated with technology integration. It also indicates that pedagogical aspects of competence may be more important than technical skills. However, there is limited empirical evidence connecting dimensions of digital competence to broader dimensions of classroom teaching practice among in-service school teachers, particularly outside European contexts. The present study was designed to contribute to this area.



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3. Research Methodology

3.1 Research Design

The study employed a quantitative, descriptive correlational survey design. This design was considered appropriate because the aim was to describe the levels of teachers' digital competence and classroom teaching practices, to examine the relationship between them, and to test differences across demographic groups without manipulating any variable.

3.2 Objectives and Hypotheses

The study sought to (a) assess the level of teachers' digital competence and classroom teaching practices; (b) examine the relationship between digital competence and classroom teaching practices; (c) compare digital competence and teaching practices by gender, type of school and teaching experience; and (d) identify the dimensions of digital competence that predict classroom teaching practices. Corresponding null hypotheses were formulated: H01, there is no significant relationship between teachers' digital competence and classroom teaching practices; H02, there is no significant difference in digital competence and teaching practices by gender; H03, there is no significant difference by type of school; H04, there is no significant difference by teaching experience; and H05, the dimensions of digital competence do not significantly predict classroom teaching practices.

3.3 Population and Sample

The population consisted of teachers working in government and private secondary and higher secondary schools in an urban district. A sample of 120 teachers was selected through stratified random sampling, with school type as the stratification variable. Twelve schools (six government and six private) were first selected randomly, and ten teachers were then randomly selected from each school. The final sample comprised 54 male and 66 female teachers, of whom 58 worked in government schools and 62 in private schools.

3.4 Research Instruments

Two instruments were developed by the researcher after reviewing established frameworks (Ferrari, 2013; Redecker, 2017) and existing measures. The Teachers' Digital Competence Scale (TDCS) contained 25 items across five dimensions: technological literacy, digital content creation, communication and collaboration, digital safety and ethics, and digital pedagogy (five items each). The Classroom Teaching Practices Scale (CTPS) contained 20 items across four dimensions: lesson planning, instructional delivery, student engagement, and assessment and feedback (five items each). Both scales used a five-point Likert format ranging from 1 (never/strongly disagree) to 5 (always/strongly agree). Content validity was established through review by five experts in education and educational technology, and items with low agreement were revised. A pilot study with 30 teachers who were not part of the final sample was conducted to refine wording. Reliability in the main study is reported in Table 2.



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3.5 Data Collection and Statistical Techniques

After obtaining permission from school heads, the questionnaires were administered in person, and the purpose of the study, voluntary participation and confidentiality were explained to respondents. All 120 questionnaires were complete and usable. Mean scores were calculated for each dimension and for each overall scale. Data were analysed using IBM SPSS Statistics. The following techniques were used: frequencies and percentages for the demographic profile; Cronbach's alpha for reliability; mean, standard deviation, skewness and kurtosis for descriptive analysis; Pearson's product-moment correlation for relationships; independent samples t-test for gender and school type; one-way ANOVA with Tukey HSD post hoc test for teaching experience; and multiple linear regression (enter method) for prediction. Skewness and kurtosis values within ± 1 were taken as evidence of approximate normality (Field, 2013). The level of significance was set at .05.

4. Results

4.1 Demographic Profile of Respondents

Table 1

Demographic Profile of the Sample (N = 120)

Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	54	45.0
	Female	66	55.0
Type of school	Government	58	48.3
	Private	62	51.7
Teaching experience	Below 5 years	34	28.3
	5–10 years	47	39.2
	Above 10 years	39	32.5
School level	Secondary	64	53.3
	Higher secondary	56	46.7
Total		120	100.0

Note. Frequencies obtained through SPSS Descriptive Statistics – Frequencies.

Table 1 shows that the sample was fairly balanced. Female teachers formed 55.0% of the sample and male teachers 45.0%. Private school teachers (51.7%) and government school teachers (48.3%) were almost equally represented. The largest experience group was 5–10 years (39.2%), followed by teachers with more than 10 years (32.5%) and those with less than 5 years (28.3%).



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4.2 Reliability of the Instruments

Table 2

Reliability Coefficients (Cronbach's Alpha) of the Scales

Scale / Dimension	No. of items	Cronbach's α
Technological literacy	5	.769
Digital content creation	5	.832
Communication and collaboration	5	.805
Digital safety and ethics	5	.819
Digital pedagogy	5	.811
Digital Competence Scale (total)	25	.907
Lesson planning	5	.788
Instructional delivery	5	.765
Student engagement	5	.769
Assessment and feedback	5	.800
Classroom Teaching Practices Scale (total)	20	.898

Note. $\alpha \geq .70$ indicates acceptable internal consistency.

All dimensions had alpha values between .765 and .832, and the total scales had values of .907 (digital competence) and .898 (classroom teaching practices). These values indicate good to excellent internal consistency, and the instruments were therefore considered reliable for the study.

4.3 Levels of Digital Competence and Classroom Teaching Practices

Table 3

Descriptive Statistics of Digital Competence and Classroom Teaching Practices (N = 120)

Dimension	M	SD	Min	Max	Skewness	Kurtosis
Technological literacy	3.72	0.58	2.16	4.94	-0.44	-0.35
Digital content creation	3.21	0.66	1.15	4.69	-0.26	0.02
Communication and collaboration	3.54	0.61	2.14	5.00	-0.21	-0.63
Digital safety and ethics	3.38	0.63	1.30	4.95	0.01	0.25
Digital pedagogy	3.29	0.64	1.89	4.67	-0.29	-0.67



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Dimension	M	SD	Min	Max	Skewness	Kurtosis
Digital competence (overall)	3.43	0.51	2.16	4.59	-0.34	-0.32
Lesson planning	3.81	0.55	2.42	4.87	-0.41	-0.39
Instructional delivery	3.64	0.57	1.63	5.00	-0.36	0.72
Student engagement	3.47	0.60	1.83	4.90	-0.11	-0.02
Assessment and feedback	3.35	0.62	1.99	5.00	-0.02	-0.42
Teaching practices (overall)	3.57	0.50	2.05	4.69	-0.38	-0.20

Note. Scores range from 1 to 5. Mean interpretation: 1.00–2.33 = low; 2.34–3.66 = moderate; 3.67–5.00 = high.

Table 3 shows that the overall level of digital competence was moderate ($M = 3.43$, $SD = 0.51$). Among its dimensions, technological literacy recorded the highest mean ($M = 3.72$), falling in the high range, followed by communication and collaboration ($M = 3.54$). The lowest means were found for digital content creation ($M = 3.21$) and digital pedagogy ($M = 3.29$). This pattern indicates that teachers were more comfortable with basic operational use of technology than with creating digital resources or using technology to transform teaching. The overall level of classroom teaching practices was moderate to high ($M = 3.57$, $SD = 0.50$). Lesson planning had the highest mean ($M = 3.81$), while assessment and feedback had the lowest ($M = 3.35$). All skewness and kurtosis values were within ± 1 , indicating that the data were approximately normal and suitable for parametric tests. Figures 1 and 2 present the dimension-wise means graphically.

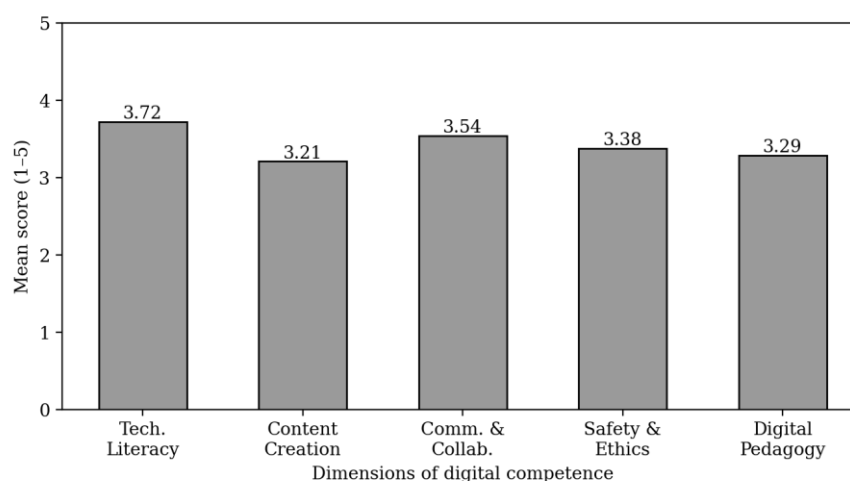


Figure 1. Mean scores of teachers on the dimensions of digital competence



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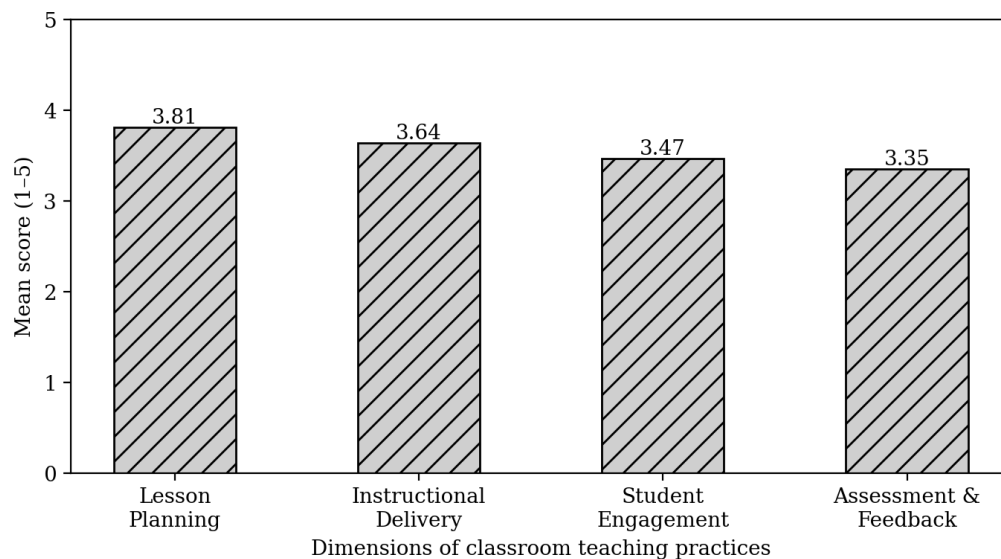


Figure 2. Mean scores of teachers on the dimensions of classroom teaching practices

4.4 Relationship between Digital Competence and Classroom Teaching Practices

Table 4

Pearson Correlation between Digital Competence and Classroom Teaching Practices

Variables	N	M	SD	r	R ²	Sig. (2-tailed)
Digital competence	120	3.43	0.51			
Classroom teaching practices	120	3.57	0.50	.676**	.457	< .001

Note. ** Correlation is significant at the 0.01 level (2-tailed).

Table 4 reveals a strong, positive and statistically significant correlation between teachers' digital competence and their classroom teaching practices, $r(118) = .676$, $p < .001$. The coefficient of determination ($R^2 = .457$) indicates that about 45.7% of the variance in teaching practices is shared with digital competence. Hence, null hypothesis H01 is rejected. Teachers with higher digital competence tended to report better planning, delivery, engagement and assessment practices. The scatter plot in Figure 3 shows a clear upward linear trend with no extreme outliers.



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Table 5

Correlation Matrix between Dimensions of Digital Competence and Classroom Teaching Practices

DC dimension	Lesson planning	Instructional delivery	Student engagement	Assessment & feedback	CTP (overall)
Technological literacy	.476**	.520**	.430**	.412**	.541**
Digital content creation	.425**	.469**	.463**	.428**	.527**
Communication and collaboration	.413**	.489**	.336**	.401**	.483**
Digital safety and ethics	.416**	.480**	.423**	.461**	.526**
Digital pedagogy	.531**	.625**	.532**	.558**	.663**
Digital competence (overall)	.557**	.636**	.540**	.557**	.676**

Note. N = 120. **p < .01 (2-tailed). DC = digital competence; CTP = classroom teaching practices.

Table 5 shows that every dimension of digital competence was positively and significantly related to every dimension of classroom teaching practice ($r = .336$ to $.663$, all $p < .01$). Digital pedagogy showed the strongest correlations, particularly with instructional delivery ($r = .625$) and overall teaching practice ($r = .663$). The weakest correlation was between communication and collaboration and student engagement ($r = .336$). Among the teaching practice dimensions, instructional delivery was the most strongly related to overall digital competence ($r = .636$).

4.5 Differences by Gender and Type of School

Table 6

Independent Samples t-test for Digital Competence and Teaching Practices by Gender and Type of School

Variable	Group	N	M	SD	t	df	Sig.
Digital competence	Male	54	3.36	0.52	-1.347	118	.180
	Female	66	3.48	0.50			



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Variable	Group	N	M	SD	t	df	Sig.
Teaching practices	Male	54	3.53	0.55	-0.664 ^a	101.49	.508
	Female	66	3.59	0.45			
Digital competence	Government	58	3.36	0.51	-1.321	118	.189
	Private	62	3.49	0.50			
Teaching practices	Government	58	3.58	0.47	0.225	118	.822
	Private	62	3.56	0.53			

Note. ^a Levene's test was significant ($F = 4.095$, $p = .045$); values for equal variances not assumed are reported.

As shown in Table 6, female teachers obtained slightly higher mean scores than male teachers on both digital competence (3.48 vs 3.36) and teaching practices (3.59 vs 3.53), but these differences were not statistically significant ($p = .180$ and $p = .508$). Similarly, private school teachers scored slightly higher on digital competence than government school teachers (3.49 vs 3.36), while government school teachers scored marginally higher on teaching practices (3.58 vs 3.56); neither difference was significant ($p = .189$ and $p = .822$). Therefore, null hypotheses H02 and H03 are retained.

4.6 Differences by Teaching Experience

Table 7

One-way ANOVA for Digital Competence and Teaching Practices by Teaching Experience

Variable	Source	Sum of squares	df	Mean square	F	Sig.	η^2
Digital competence	Between groups	3.927	2	1.963	8.538	.000	.127
	Within groups	26.905	117	0.230			
	Total	30.832	119				
Teaching practices	Between groups	2.217	2	1.108	4.799	.010	.076
	Within groups	27.023	117	0.231			
	Total	29.240	119				

Note. Group means (DC / CTP): below 5 years ($n = 34$) = 3.65 / 3.70; 5–10 years ($n = 47$) = 3.46 / 3.63; above 10 years ($n = 39$) = 3.19 / 3.38. Sig. .000 is reported as $p < .001$.



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Table 7 indicates a significant effect of teaching experience on digital competence, $F(2, 117) = 8.538$, $p < .001$, $\eta^2 = .127$, and on classroom teaching practices, $F(2, 117) = 4.799$, $p = .010$, $\eta^2 = .076$. Null hypothesis H04 is therefore rejected. Tukey HSD post hoc tests showed that teachers with less than 5 years of experience had significantly higher digital competence than those with more than 10 years ($p < .001$), and teachers with 5–10 years also scored significantly higher than those with more than 10 years ($p = .029$). For teaching practices, teachers with more than 10 years of experience scored significantly lower than those with less than 5 years ($p = .012$) and those with 5–10 years ($p = .046$). Figure 4 illustrates this declining trend across experience groups.

4.7 Prediction of Classroom Teaching Practices

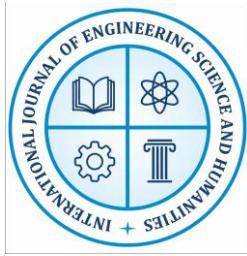
Table 8

Multiple Regression Analysis: Dimensions of Digital Competence Predicting Classroom Teaching Practices

Predictor	B	SE	β	t	Sig.
(Constant)	1.368	0.238		5.746	< .001
Technological literacy	0.109	0.087	.128	1.259	.211
Digital content creation	0.037	0.074	.050	0.501	.617
Communication and collaboration	0.009	0.080	.011	0.108	.914
Digital safety and ethics	0.169	0.063	.216	2.674	.009
Digital pedagogy	0.326	0.082	.423	3.983	< .001

Note. Dependent variable: classroom teaching practices. $R = .703$, $R^2 = .495$, adjusted $R^2 = .472$, SE of estimate = 0.360; $F(5, 114) = 22.307$, $p < .001$ (SS regression = 14.460, SS residual = 14.780).

Table 8 shows that the five dimensions of digital competence together formed a significant model for predicting classroom teaching practices, $F(5, 114) = 22.307$, $p < .001$. The model explained 49.5% of the variance in teaching practices (adjusted $R^2 = .472$). Null hypothesis H05 is therefore rejected. When all dimensions were considered together, digital pedagogy was the strongest unique predictor ($\beta = .423$, $t = 3.983$, $p < .001$), followed by digital safety and ethics ($\beta = .216$, $t = 2.674$, $p = .009$). Technological literacy, digital content creation, and communication and collaboration did not make significant unique contributions once the other dimensions were controlled, although each was significantly correlated with teaching practice in Table 5. This



International Journal of Engineering, Science and Humanities

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suggests that their influence largely overlaps with the pedagogical use of technology. Figure 5 compares the standardised coefficients.

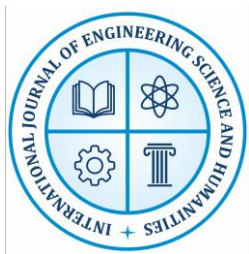
4.8 Discussion

The main finding of this study is the strong positive relationship between teachers' digital competence and classroom teaching practices. This result is consistent with Ertmer et al. (2012) and Gil-Flores et al. (2017), who found that teachers' knowledge, confidence and skills were closely connected with the quality and extent of technology integration. It extends earlier research by showing that the relationship holds not only for technology use but for broader teaching practices such as planning, delivery, engagement and assessment.

The finding that digital pedagogy was the strongest predictor supports the argument that teachers' professional digital competence is fundamentally pedagogical (Krumsvik, 2014; Redecker, 2017). It is also in line with TPACK research, which stresses the integration of technological, pedagogical and content knowledge rather than technological knowledge alone (Chai et al., 2013; Voogt et al., 2013). The relatively low mean for digital pedagogy, despite its predictive strength, indicates an important gap: teachers had reasonable operational skills but were less confident in using technology to redesign learning. Similar gaps between technical and pedagogical competence have been reported in teacher education (Instefjord & Munthe, 2016; Røkenes & Krumsvik, 2014).

The significant contribution of digital safety and ethics is an interesting result. Teachers who understand issues of privacy, responsible use, copyright and online safety may be more willing to use technology openly with students and to guide them in evaluating information. This is consistent with Hatlevik (2017), who found that teachers' strategies for evaluating information were related to their digital competence and ICT use, and with Siddiq et al. (2016), who linked teachers' attention to students' digital skills with their own competence.

The absence of gender and school-type differences suggests that access to digital tools and training may now be relatively similar across these groups, a finding that agrees with studies reporting weak or inconsistent gender effects (Koh et al., 2014). The decline in both digital competence and teaching practice scores with longer experience agrees with Koh et al. (2014), who reported higher technological knowledge among less experienced teachers. Younger teachers may have encountered digital tools during their own education and pre-service training. However, this finding should not be read as a weakness of experienced teachers' pedagogy in general; rather, it indicates that experienced teachers may need targeted support to connect their rich pedagogical knowledge with new technologies, as suggested by research on beliefs and practice (Kim et al., 2013; Petko, 2012; Tondeur et al., 2017).



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5. Conclusion

This study examined the relationship between teachers' digital competence and classroom teaching practices among 120 secondary and higher secondary school teachers. The results showed that teachers possessed a moderate level of digital competence, with relatively strong technological literacy but weaker digital content creation and digital pedagogy. Their classroom teaching practices were at a moderate to high level, with lesson planning being the strongest area and assessment and feedback the weakest. A strong and significant positive correlation was found between digital competence and classroom teaching practices, and all dimensions of digital competence were significantly correlated with all dimensions of teaching practice.

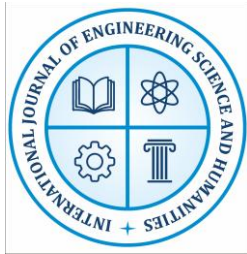
Gender and type of school did not produce significant differences, whereas teaching experience did, with teachers having more than 10 years of experience scoring lower on both variables. Multiple regression analysis showed that digital competence dimensions jointly explained nearly half of the variance in teaching practices, and that digital pedagogy and digital safety and ethics were the significant unique predictors. The central conclusion is that the pedagogical dimension of digital competence, rather than technical skill alone, is most closely associated with quality classroom teaching.

Several implications follow. Professional development programmes should move beyond training in software and devices and focus on designing lessons, activities and assessments that use technology to support learning. Teacher education curricula should integrate digital competence within subject methods courses rather than treating it as a separate module. Training on digital safety, ethics and information evaluation should be included as a core element, since it contributes to teachers' willingness and ability to use technology responsibly. Experienced teachers should be supported through mentoring, peer collaboration and school-based communities of practice in which their pedagogical expertise can be combined with the digital fluency of newer colleagues. School leaders should also strengthen the use of digital tools for assessment and feedback, which emerged as the weakest area of practice.

The study has certain limitations. It relied on self-report measures, which may be affected by social desirability. The sample was limited to 120 teachers from one district, which restricts generalisation. The correlational design does not permit causal conclusions. Future research could use classroom observation and student outcome data, include larger and more diverse samples, and employ longitudinal or experimental designs to examine whether improvements in digital competence lead to changes in teaching practice over time.

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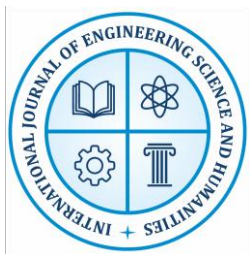
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