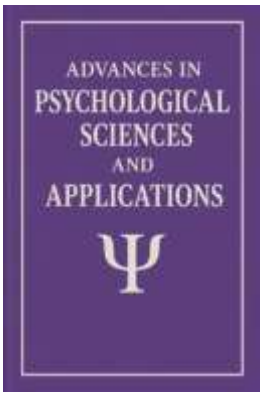
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Teachers' Self-Reported Digital Literacy and Digital Instructional Material Development Self-Efficacy

A Cross-Sectional Survey

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ABSTRACT

This cross-sectional descriptive-correlational survey examined teachers' self-reported digital literacy and digital instructional material development self-efficacy and their associations with demographic characteristics. Participants were 314 teachers (177 women and 137 men) working in Sivas, Türkiye, during the spring semester of 2024–2025. Data were collected online using the Digital Literacy Scale and the Teachers' Digital Instructional Material Development Self-Efficacy Scale. Reported descriptive statistics, group comparisons, and Pearson correlations were examined. Mean digital literacy was 3.45 (SD = 0.86), classified as high under the prespecified interpretive intervals, whereas overall material-development self-efficacy was moderate (M = 3.34, SD = 0.77). The two scores were positively correlated ($r = .622$, $p < .001$). Overall self-efficacy did not differ significantly by gender ($p = .063$), educational attainment ($p = .217$), or daily digital-tool-use duration ($p = .182$), although selected subscale comparisons were significant in unadjusted analyses. These findings concern self-reported perceptions rather than objectively demonstrated digital competence. Interpretation is provisional pending verification of scale coding and score ranges, missing-data procedures, and multiple-testing adjustments. The cross-sectional design does not establish causality.

Keywords
Cross-Sectional Survey
Digital İnstructional Materials
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Introduction

Digital literacy is a competency that requires the effective and critical use of information and communication technologies. The widespread integration of these technologies into education has made it essential for teachers to possess digital literacy skills. Digital literacy extends beyond the ability to operate digital devices; it encompasses accessing information in digital environments, evaluating and creating content, and using information ethically. These competencies enable teachers to modernize their pedagogical approaches and deliver instruction in alignment with the demands of the contemporary era. Gilster [1] defines digital literacy as the ability to understand and interpret information using digital tools. According to him, digital literacy is not limited to technical skills but also relies on critical thinking abilities. Bawden [2] approaches digital literacy in connection with information literacy and defines it as the ability to use digital resources effectively. In his view, digital literacy goes beyond the use of technological tools and includes the analysis, evaluation, and ethical use of information. Eshet [3] conceptualizes digital literacy as comprising five key components: photo-visual literacy, information literacy, online literacy, reproduction literacy, and socio-emotional literacy. Martin and Grudziecki [4] argue that digital literacy is a competence developed throughout an individual's lifelong learning process, involving the ability to access information through digital tools, analyze it, and generate creative solutions. Ng [5] identifies digital literacy as consisting of three dimensions: technological, cognitive, and socio-emotional. Similarly, OECD [6] defines digital literacy as the ability to access, manage, analyze, and share information in digital environments, while also emphasizing issues such as combating misinformation and ensuring digital safety.

With the advancement of technology, digital transformation in education has become inevitable. In this context, teachers' digital literacy skills play a critical role in enriching learning environments and enhancing students' academic achievement. The effective use of digital resources and instructional materials not only makes lessons more engaging and interactive but also increases students' motivation to learn [7]. Similarly, integrating digital resources into teaching practices contributes to both the quality of instruction and students' engagement levels [8]. Digital literacy supports teachers in making instruction more accessible while also facilitating the development of student-centered learning environments. It refers to individuals' ability to use digital technologies effectively and consciously. For teachers, these competencies provide significant advantages, such as integrating instructional materials into digital platforms and offering learning experiences tailored to students' individual differences through technological resources [9]. With the increasing prevalence of online learning platforms, teachers with

advanced digital literacy skills are better able to design effective lesson plans and create more inclusive educational processes. Moreover, digitally literate teachers can design technology-enhanced learning environments that increase students' interest in lessons. Technologies such as interactive whiteboards, e-learning platforms, augmented reality, and virtual reality contribute to making learning experiences more inclusive and engaging [10]. In addition, digital literacy encompasses the effective use of e-learning materials, thereby facilitating students' access to information.

In contemporary educational settings, teachers are expected not only to possess digital literacy skills but also to have the competence to develop digital instructional materials. Digital instructional materials can be defined as resources presented in various digital formats that support the learning process. According to Bates [11], these materials are electronically delivered resources designed to facilitate and enhance educational processes. They may include text, audio, video, animations, and interactive content, all aimed at enriching the learning experience. Similarly, El-Sabagh [12] describes digital instructional materials as electronic content that can be customized according to students' individual learning paces, thereby making learning processes more effective. Such materials promote active student engagement and support deep and lasting learning. Karataş and Yıldırım [13] further emphasize that digital learning tools consist of multimedia elements—such as text, audio, visuals, animations, and videos—that can be accessed through technological devices including computers, tablets, and smartphones. Compared to traditional instructional materials, these resources offer greater flexibility, accessibility, and opportunities for student-centered learning. Taken together, these definitions highlight that, in addition to developing digital tools and environments, the ability to use them effectively is equally important. In this regard, teachers need to possess well-developed competencies in both the design and effective implementation of digital materials used in classroom learning processes.

Digital material development requires the effective use of technology in instructional processes as well as the ability to create appropriate digital content tailored to students' needs. Several key components are essential for teachers to acquire these competencies. One of the most prominent among these is Technological Pedagogical Content Knowledge (TPACK), which emphasizes the importance of maintaining a balanced integration of technology, pedagogy, and subject matter knowledge in the teaching process [14]. Another critical component is digital content creation skills, which involve teachers' ability to utilize tools such as videos, animations, interactive presentations, and web-based applications to design instructional materials [15]. Furthermore, the effective use of educational technologies enhances teachers' success in the material development process by enabling the efficient use of digital tools and platforms [16].

It is stated that teachers' processes of developing and using digital instructional materials consist of several distinct stages. In the first stage, awareness, teachers are expected to become aware of digital instructional materials and understand their potential in education [17]. This stage enables teachers to develop cognitive awareness regarding how digital technologies can be integrated into instructional processes [15]. In the second stage, selection and implementation, teachers are required to identify and use digital materials that are appropriate for course content and instructional objectives. In this process, the ability to effectively use technological tools for pedagogical purposes becomes particularly important [18]. Ensuring that the selected materials are aligned with students' developmental levels and learning needs is considered a key factor in enhancing the effectiveness of the instructional process [19]. The third stage, adaptation, involves integrating digital materials into lesson plans and developing effective usage strategies. At this stage, teachers are expected to align digital materials with the curriculum and facilitate more interactive and learner-centered learning experiences for students [20]. In this regard, digital technologies should be regarded not merely as supportive tools but as essential components that shape the learning process [14]. In the final stage, evaluation and feedback, teachers are required to analyze the impact of digital instructional materials on learning outcomes. These evaluations enable necessary improvements to enhance the effectiveness of the teaching process [21]. Feedback obtained from students and conducted evaluations serves as an important guide for the more effective use of digital materials [22].

Digital literacy and self-efficacy in digital instructional material development are conceptually related but distinct. Digital literacy encompasses critical evaluation, ethical use, and creation of digital information, whereas material-development self-efficacy describes teachers' beliefs about their capacity to undertake relevant instructional design tasks. These self-reports should not be interpreted as direct measures of performance. Prior work has examined related constructs, including Kurt et al. [23], who studied digital literacy and Web 2.0 rapid content-development self-efficacy. The present study extends this related literature by examining a broader digital instructional material development self-efficacy instrument and describing variation across teacher characteristics in a sample from Sivas; it does not claim to be the first joint investigation of these constructs.

This study describes teachers' self-reported digital literacy and digital instructional material development self-efficacy and explores their association and unadjusted differences across demographic groups. The study does not evaluate the quality of materials produced or changes in teaching effectiveness. Its contribution lies in reporting the two measures together in this local teacher sample, while recognizing the related evidence of Kurt et al. [23].

1. What are teachers' levels of digital literacy and digital material development self-efficacy?

2. Do teachers' digital literacy and digital material development self-efficacy differ significantly according to research variables?
3. What is the direction and level of the relationship between digital literacy and digital material development self-efficacy?

Methods

A quantitative, cross-sectional descriptive-correlational survey was used. Both constructs and demographic characteristics were measured at one time point. Consequently, analyses identify concurrent associations and group differences, not temporal or causal effects.

A. Sample Group

The study included 314 teachers from various subject areas and educational levels in Sivas, Türkiye, during the spring semester of 2024–2025. School principals facilitated electronic distribution of the questionnaire. Although the initial report characterized recruitment as simple random sampling, it did not describe a sampling frame or a random-selection procedure. Recruitment is therefore presented conservatively as school-mediated voluntary participation. The numbers of eligible or invited teachers and nonrespondents were not available in the study report, so a response rate cannot be determined. These limitations restrict the representativeness of the analytic sample.

Table 1. Demographic information of the sample

Variable		f	%
Gender	Female	177	56.4
	Male	137	43.6
Age	20-30	95	30.3
	31-40	126	40.1
	41-50	63	20.1
	51 and abova	30	9.6
cational Level	Undergraduate	237	75.5
	Postgraduate	77	24.5
Professional Seniority	1–10 years	129	41.1
	11–20 years	133	42.4
	21 years and above	52	16.6
Training in Digitalization in Education	Took it as a course during undergraduate education	93	29.6
	Received in-service training	58	18.5
	Gained through seminars/conferences	30	9.6
	Learned through individual efforts	76	24.2
	No training received	57	18.2
Daily Digital Tool Usage Time	0–1 hour	43	13.7
	2–3 hours	139	44.3
	4–5 hours	96	30.6
	6 hours and above	36	11.5
Total		314	100

When Table 1 is examined, it is seen that 177 teachers are female and 137 are male, while 237 hold an undergraduate degree and 77 hold a postgraduate degree. It is observed that the teachers included in the study group are most frequently in the 31–40 age range, whereas the least frequent age group is 51 years and above. Regarding professional seniority, 129 teachers have 1–10 years of experience, 133 have 11–20 years, and 52 have 21 years or more of professional experience. It is also understood that, in terms of training in digitalization in education, the majority of teachers received such training during their undergraduate studies. In addition, concerning daily digital tool usage time, there are 43 teachers using digital tools for 0–1 hour, 139 teachers for 2–3 hours, 96 teachers for 4–5 hours, and 36 teachers using them for 6 hours and above.

B. Data Collection Instruments

In this study, a personal information form, the Digital Literacy Scale, and the Teachers' Digital Instructional Material Development Self-Efficacy Scale were used to collect data. The personal information form was developed by the researchers and includes items related to the descriptive characteristics of the study group.

Digital Literacy Scale (DL Scale): The 10-item five-point instrument developed by Ng [5] and adapted into Turkish by Üstündağ et al. [24] was used. The theoretical summed score ranges from 10 to 50, while the descriptive findings are presented as item means on a 1–5 metric. The reported internal-consistency coefficient was Cronbach's alpha = .941. The source report does not specify the item-level missing-data rule or whether any items were reverse-keyed; accordingly, scoring reproducibility cannot be independently established from the published aggregate information.

Teachers' Digital Instructional Material Development Self-Efficacy Scale (DIMDSE Scale): The 38-item instrument developed by Korkmaz et al. [25] includes Web 2.0 Development (14 items), Design (18 items), and Negative Attitude (6 items). The reported overall Cronbach's alpha was .975. Because the source report did not establish how negatively worded items were treated, the direction of the Negative Attitude subscale and the construction of the overall composite cannot be independently verified. For a 1–5 item requiring reversal, the conventional transformation is 6 minus the original item score; this procedure is described for clarity and is not asserted to have been implemented in the present dataset.

Table 2 presents the normality and reliability analysis results obtained from the application of the Digital Literacy Scale and the Digital Instructional Material Development Self-Efficacy Scale. Skewness and kurtosis provide descriptive evidence about distributions but do not establish normality of model residuals or equal variances. The original table reports minimum item-mean scores of 0.79 for Web 2.0 Development and 0.93 for overall self-efficacy.

Table 2. Reported scale distributions and internal consistency

Dimension/Scale	Number of Items	Minimum	Maximum	Skewness	Kurtosis	Cronbach's Al
DL Scale	10	1.00	5.00	-.615	.509	.941
Web 2.0 Development	14	0.79	5.00	-.401	-.409	.974
Design	18	1.00	5.00	-.716	.138	.984
Negative Attitude	6	1.00	5.00	-.306	-.655	.933
DIMDSE Scale	38	0.93	5.00	-.313	.495	.975

Both are below the theoretical minimum of 1.00 for means of items scored from 1 to 5. Because item-level responses are unavailable, these figures are reproduced as reported, cannot be validated, and should not be interpreted as legitimate five-point scale scores. The remaining aggregate findings are interpreted cautiously in light of this unresolved scoring inconsistency.

C. Data Collection Process and Data Analysis

Following institutional permission reported by the investigators, principals in Sivas were contacted and facilitated online questionnaire distribution to teachers. Data collection lasted 25 days, and the downloaded responses were organized in Excel and analyzed using SPSS 25. No incentives or coercion were reported. The questionnaire platform, precise collection dates, number of invitations, exclusions, incomplete responses, duplicate-prevention procedures, consent documentation, and ethics committee determination were not specified in the available study record. Scale means were interpreted using the prespecified intervals 1.00–1.80 (very low), 1.81–2.60 (low), 2.61–3.40 (moderate), 3.41–4.20 (high), and 4.21–5.00 (very high). The reported analyses comprised independent-samples t tests, one-way ANOVA, Tukey post hoc tests, and Pearson correlation. The original results do not supply diagnostic tests of variance homogeneity, observations used per comparison, or a multiple-testing correction. Group tests are consequently treated as exploratory, unadjusted comparisons; they cannot isolate effects of related characteristics such as age and professional seniority.

Results

The descriptive findings regarding teachers' digital literacy and digital instructional material development self-efficacy levels obtained in the study are presented in Table 3.

Table 3. Descriptive findings on teachers' digital literacy and digital instructional material development self-efficacy levels

Dimension/Scale	X	SD
DL Scale	3.45	0.86
Web 2.0 Development	3.04	1.05
Design	3.60	0.98
Negative Attitude	3.39	1.04
DIMDSE Scale	3.34	0.77

On the reported 1–5 metric, digital literacy was high (M = 3.45, SD = 0.86) and overall digital instructional material development self-efficacy was moderate (M = 3.34, SD = 0.77). Design was high (M = 3.60), whereas Web 2.0 Development (M = 3.04) and Negative Attitude (M = 3.39) fell in the moderate interval. Interpretation of the Negative Attitude score depends on confirmation of its coding direction. These are perceived, not performance-assessed, levels.

Table 4. Findings on digital literacy and digital instructional material development self-efficacy in terms of gender

Gender		N	x	sd	t	*p*
DL Scale	Female	177	3.50	0.78	1.093	.275
	Male	137	3.39	0.95		
Web 2.0 Development	Female	177	3.11	1.04	1.355	.176
	Male	137	2.95	1.05		
Design	Female	177	3.74	0.92	2.872	**.004***
	Male	137	3.42	1.02		
Negative Attitude	Female	177	3.40	0.99	.084	.933
	Male	137	3.39	1.09		
DIMDSE Scale	Female	177	3.42	0.76	1.866	.063
	Male	137	3.26	0.76		

*p<.05

The original gender comparisons showed no statistically significant difference in overall digital literacy (p = .275) or overall material-development self-efficacy (p = .063). A difference was reported for the Design subscale (female M = 3.74; male M = 3.42; p = .004), but not for the Web 2.0 Development or Negative Attitude subscales. This unadjusted finding should not be generalized to overall self-efficacy or demonstrated design competence. Its robustness to multiplicity adjustment remains to be examined.

Table 5. Findings on digital literacy and digital instructional material development self-efficacy in terms of age

Age		N	x	SD	Source of Variance	Sum of Squares	SD	Mean Square	F	*p*	Significant Difference
DL Scale	20-30[a]	95	3.58	0.72	Between Groups	9.597	310;3	3.199	4.498	**.004***	a.b.c>d
	31-40[b]	126	3.46	0.91							
	41-50[c]	63	3.48	0.80	Within Groups	220.464		.711			
	51 +[d]	30	2.94	0.98	Total	230.061					
Web 2.0 Development	20-30[a]	95	3.23	0.92	Between Groups	22.024	310;3	7.341	7.108	**.000***	a.b.c>d
	31-40[b]	126	3.10	1.04							
	41-50[c]	63	3.02	1.02	Within Groups	320.189		1.033			
	51 +[d]	30	2.26	1.20	Total	342.214					
Design	20-30[a]	95	3.88	0.78	Between Groups	25.134	310;3	8.378	9.500	**.000***	a.b.c>d
	31-40[b]	126	3.63	0.9							
	41-50[c]	63	3.49	0.99	Within Groups	273.395		.882			
	51 +[d]	30	2.86	1.09	Total	298.529					
Negative Attitude	20-30[a]	95	3.14	0.98	Between Groups	10.335	310;3	3.445	3.276	**.021***	c>a
	31-40[b]	126	3.49	1.03							

Age		N	x	SD	Source of Variance	Sum of Squares	SD	Mean Square	F	*p*	Significant Difference
	41-50[c]	63	3.61	1.00	Within Groups	325.975		1.052			
	51 +[d]	30	3.33	1.20	Total	336.310					
DIMDSE Scale	20-30[a]	95	3.42	0.64	Between Groups	9.434		3.145			
	31-40[b]	126	3.41	0.76							
	41-50[c]	63	3.37	0.80	Within Groups	174.504	310;3	.563	5.587	**.001***	a.b.c>d
	51 +[d]	30	2.82	0.92	Total	183.938					

*p<.05

In the original unadjusted age-group analyses, overall digital literacy (p = .004) and overall self-efficacy (p = .001) differed across age categories, with lower means reported for teachers aged 51 years and older. Several subscales also differed. These results are exploratory pending score verification and adjustment for multiple testing; age-group differences should not be attributed to age independently of seniority or other characteristics.

Table 6. Reported group comparisons by educational attainment

Educational Level		N	x	SD	t	*p*
DL Scale	Undergraduate	237	3.40	.087	-2.042	**.042***
	Postgraduate	77	3.63	0.79		
Web 2.0 Development	Undergraduate	237	3.00	1.06	-1.221	.223
	Postgraduate	77	3.17	1.00		
Design	Undergraduate	237	3.52	0.99	-2.552	**.011***
	Postgraduate	77	3.85	0.91		
Negative Attitude	Undergraduate	237	3.42	1.06	.874	.383
	Postgraduate	77	3.31	0.95		
DIMDSE Scale	Undergraduate	237	3.32	0.78	-1.236	.217
	Postgraduate	77	3.44	0.72		

*p<.05

The reported digital literacy mean was higher among postgraduate teachers (M = 3.63) than undergraduate teachers (M = 3.40; p = .042), correcting the direction stated in the original narrative. The Design subscale was also higher among postgraduate teachers (3.85 vs. 3.52; p = .011). Overall material-development self-efficacy did not differ significantly by educational level (p = .217). The two nominally significant comparisons require reassessment after correction for multiple testing and verification of the reported undergraduate digital-literacy SD.

Table 7. Findings on digital literacy and digital instructional material development self-efficacy in terms of professional seniority

Professional Seniority		N	x	SD	Source of Variance	Sum of Squares	SD	Mean Square	F	*p*	Significant Difference
DL Scale	1-10[a]	129	3.54	0.79	Between Groups	5.508	311;2	2.754	3.815	**.023***	a>c
	11-20[b]	133	3.48	0.82	Within Groups	224.553		.722			
	21 +[c]	52	3.16	1.06	Total	230.061					
Web 2.0 Development	1-10[a]	129	3.04	1.00	Between Groups	9.973	311;2	4.987	4.668	**.010***	b>c
	11-20[b]	133	3.19	0.99	Within Groups	332.241		1.068			

Professional Seniority		N	x	SD	Source of Variance	Sum of Squares	SD	Mean Square	F	*p*	Significant Difference
	21 +[c]	52	2.67	1.22	Total	342.214					
Design	1-10[a]	129	3.78	0.91	Between Groups	15.620	311;2	7.810	8.586	**.000***	a.b>c
	11-20[b]	133	3.61	0.90	Within Groups	282.909		.910			
	21 +[c]	52	3.13	1.18	Total	298.529					
Negative Attitude	1-10[a]	129	3.17	1.01	Between Groups	12.356	311;2	6.178	5.931	**.003***	b>a
	11-20[b]	133	3.60	0.95	Within Groups	323.954		1.042			
	21 +[c]	52	3.42	1.20	Total	336.310					
DIMDSE Scale	1-10[a]	129	3.33	0.72	Between Groups	5.833	311;2	2.916	5.092	**.007***	b>c
	11-20[b]	133	3.47	0.71	Within Groups	178.105		.573			
	21 +[c]	52	3.08	0.95	Total	183.938					

*p<.05

The original professional-seniority analyses reported differences in digital literacy (p = .023), overall material-development self-efficacy (p = .007), and several subscales. The 21-years-or-more group generally reported lower means on digital literacy and the positive self-efficacy dimensions than some less-experienced groups. However, the Negative Attitude direction cannot be interpreted until its coding is verified. These are unadjusted associations and should not be treated as independent of age.

Table 8. Findings on digital literacy and digital instructional material development self-efficacy in terms of daily digital tool usage time

Daily Digital Tool Usage Time		N	x	SD	Source of Variance	Sum of Squares	SD	Mean Square	F	*p*	Significant Difference
DL Scale	0-1[a]	43	2.97	1.22	Between Groups	11.578	310.3	3.859	5.476	.001*	b.c.d>a
	2-3[b]	139	3.51	0.80							
	4-5[c]	96	3.55	0.69	Within Groups	218.483		.705			
	6 +[d]	36	3.55	0.80	Total	230.061					
Web 2.0 Development	0-1[a]	43	2.72	1.32	Between Groups	6.018	310;3	2.006	1.850	.138	-
	2-3[b]	139	3.05	1.05							
	4-5[c]	96	3.17	0.98	Within Groups	336.196		1.085			
	6 +[d]	36	3.08	0.73	Total	342.214					
Design	0-1[a]	43	3.22	1.24	Between Groups	8.358	310.3	2.786	2.976	.032*	c>a
	2-3[b]	139	3.60	0.98							
	4-5[c]	96	3.74	0.87	Within Groups	290.171		.936			
	6 +[d]	36	3.70	0.76	Total	298.529					
Negative Attitude	0-1[a]	43	3.45	1.17	Between Groups	.209	310.3	.070	.064	.979	-
	2-3[b]	139	3.38	1.06							
	4-5[c]	96	3.41	1.00	Gruplar İçi	336.101		1.084			
	6 +[d]	36	3.38	0.88	Total	336.310					
DIMDSE Scale	0-1[a]	43	3.13	0.92	Between Groups	2.862	310.3	.954	1.633	.182	-
	2-3[b]	139	3.34	0.80							
	4-5[c]	96	3.44	0.69	Within Groups	181.076		.584			
	6 +[d]	36	3.38	0.59	Total	183.938					

Daily digital-tool-use groups differed in digital literacy (p = .001) and the Design subscale (p = .032) in the original analyses. However, the overall material-development self-efficacy comparison was not significant (p = .182), nor were Web 2.0 Development (p = .138) and Negative Attitude (p = .979). Duration of tool use is not evidence of effective instructional use, and these cross-sectional comparisons do not establish that additional technology use increases ability.

Table 9. Correlation analysis results between teachers' digital literacy and digital instructional material development self-efficacy

Variable	N	r	*p*
DL Scale DIMDSE Scale	314	.622**	**.000***

**p<.001

The reported Pearson correlation indicated a positive association between self-reported digital literacy and material-development self-efficacy (r = .622, N = 314, p < .001). An approximate 95% confidence interval calculated from the published r and N using Fisher's z transformation is 0.549–0.685; it is conditional on the reported composite scores being correct. The correlation indicates concurrent covariation, not an effect of either construct on the other. Common self-report response processes may contribute to the observed association.

Discussion, Limitations, and Conclusion

These results concern teachers' perceptions rather than independently demonstrated teaching competence. Because item-level responses and full scoring specifications were not available for this editorial revision, aggregate findings are reported as originally supplied and should be read with the measurement limitations described above.

The reported mean digital literacy score was classified as high, while overall digital instructional material development self-efficacy was moderate under the study's own scoring thresholds. This distinction corrects the earlier characterization of both outcomes as high. Teachers' reported confidence does not establish that their digital products meet pedagogical or technical quality standards. Prior frameworks such as TPACK [14] underscore that effective instruction also depends on pedagogical and content knowledge.

Gender was not associated with a statistically significant difference in either overall outcome in the unadjusted tests. A higher Design subscale mean among women was observed, but this should be described only as a difference in self-reported design self-efficacy, not superior demonstrated design skill. Likewise, postgraduate teachers reported higher digital literacy and Design scores, but the overall self-efficacy comparison was nonsignificant. Given the number of comparisons, isolated p values close to .05 should be interpreted cautiously.

The reported age and professional-seniority patterns suggest differences across career stages, but their strong conceptual and empirical overlap prevents causal or independent interpretation from separate one-factor analyses. The notion that older teachers necessarily have weaker digital competence is not supported by self-reports alone. Future analyses should model relevant characteristics jointly and evaluate collinearity; future studies could supplement surveys with direct assessment of instructional materials.

The education-level results require particular care: the postgraduate group had a higher reported digital literacy mean, contrary to the original text. Cross-sectional group comparisons cannot establish that postgraduate education produced this difference. Educational attainment may also be associated with access, professional roles, and prior training, which were not jointly controlled in the reported tests.

Teachers reporting longer daily digital-tool use had higher digital literacy scores in the original unadjusted comparisons, but the overall self-efficacy comparison was not statistically significant. The amount of time spent using technology is not a measure of purposeful pedagogical application. The association may reflect self-selection or other unmeasured characteristics rather than an effect of increased usage.

The reported correlation ($r = .622$) supports an association between two self-reported constructs, consistent with the closely related investigation by Kurt et al. [23]. However, the common self-report method, single-province recruitment, unclear participation denominator, and cross-sectional design restrict causal interpretation and generalizability. Moreover, subscale minima below the theoretically permitted range and undocumented negative-item scoring limit confidence in the reported composite statistics. The findings may therefore motivate, but cannot evaluate the effectiveness of, professional development combining digital literacy, instructional design, and assessment of actual material quality. Future work should document item scoring and missingness, report sampling and ethics procedures, test model assumptions, control multiple comparisons, examine age and seniority jointly, and use performance-based and longitudinal outcomes. This study does not demonstrate that greater digital literacy or longer technology use improves digital instructional material production.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] P. Gilster, Digital Literacy. New York, NY, USA: John Wiley & Sons, 1997.
[2] D. Bawden, "Information and digital literacies: A review of concepts," Journal of Documentation, vol. 57, no. 2, pp. 218–259, 2001, doi: 10.1108/EUM0000000007083.

[3] Y. Eshet-Alkalai, "Digital literacy: A conceptual framework for survival skills in the digital era," Journal of Educational Multimedia and Hypermedia, vol. 13, no. 1, pp. 93–106, 2004.
[4] A. Martin and J. Grudziecki, "DigEuLit: Concepts and tools for digital literacy development," Innovation in Teaching and Learning in Information and Computer Sciences, vol. 5, no. 4, pp. 249–267, 2006, doi: 10.11120/ital.2006.05040249.
[5] W. Ng, "Can we teach digital natives digital literacy?," Computers & Education, vol. 59, no. 3, pp. 1065–1078, 2012, doi: 10.1016/j.compedu.2012.04.016.
[6] OECD, "21st century skills and digital literacy," 2021. [Bibliographic publication details not verified.]
[7] C. Redecker, European Framework for the Digital Competence of Educators: DigCompEdu, Y. Punie, Ed. Luxembourg: Publications Office of the European Union, 2017, doi: 10.2760/159770.
[8] D. Susanti, L. Y. Sari, and V. Fitriani, "Increasing student learning motivation through the use of interactive digital books based on Project Based Learning (PjBL)," Jurnal Penelitian Pendidikan IPA, vol. 8, no. 4, pp. 1730–1735, 2022, doi: 10.29303/jppipa.v8i4.1669.
[9] L. Heitin, "What is digital literacy?," Education Week, Nov. 8, 2016.
[10] N. Selwyn, Education and Technology: Key Issues and Debates, 2nd ed. London, UK: Bloomsbury Academic, 2016.
[11] A. W. Bates, Teaching in a Digital Age: Guidelines for Designing Teaching and Learning, 2nd ed. Vancouver, BC, Canada: Tony Bates Associates Ltd., 2019. [Online]. Available: https://pressbooks.bccampus.ca/teachinginadigitalagev2/
[12] H. A. El-Sabagh, "Adaptive e-learning environment based on learning styles and its impact on development students' engagement," International Journal of Educational Technology in Higher Education, vol. 18, art. no. 53, 2021, doi: 10.1186/s41239-021-00274-3.
[13] S. Karataş and Z. Yıldırım, "Eğitimde dijital materyallerin kullanımı ve etkileri," Eğitim ve Bilim Dergisi, vol. 45, no. 4, pp. 112–128, 2020. [Publication record not independently verified.]
[14] M. J. Koehler, P. Mishra, and W. Cain, "What is technological pedagogical content knowledge (TPACK)?," Journal of Education, vol. 193, no. 3, pp. 13–19, 2013, doi: 10.1177/002205741319300303.
[15] P. A. Ertmer and A. T. Ottenbreit-Leftwich, "Teacher technology change: How knowledge, beliefs, and culture intersect," Journal of Research on Technology in Education, vol. 42, no. 3, pp. 255–284, 2010, doi: 10.1080/15391523.2010.10782551.
[16] C. M. Reigeluth and A. A. Carr-Chellman, Eds., Instructional-Design Theories and Models: Building a Common Knowledge Base, vol. 3. New York, NY, USA: Routledge, 2009.
[17] P. Mishra and M. J. Koehler, "Technological pedagogical content knowledge: A framework for teacher knowledge," Teachers College Record, vol. 108, no. 6, pp. 1017–1054, 2006, doi: 10.1111/j.1467-9620.2006.00684.x.
[18] J. L. Howland, D. H. Jonassen, and R. M. Marra, Meaningful Learning with Technology, 4th ed., Pearson New International Edition. Harlow, UK: Pearson, 2013.
[19] R. E. Mayer, "Designing multimedia instruction in anatomy: An evidence-based approach," Clinical Anatomy, vol. 33, no. 1, pp. 2–11, 2020, doi: 10.1002/ca.23265.
[20] A. Collins and R. Halverson, Rethinking Education in the Age of Technology: The Digital Revolution and Schooling in America, 2nd ed. New York, NY, USA: Teachers College Press, 2018.
[21] D. R. Garrison and N. D. Vaughan, Blended Learning in Higher Education: Framework, Principles, and Guidelines. San Francisco, CA, USA: Jossey-Bass, 2008.
[22] T. C. Reeves and J. G. Hedberg, Interactive Learning Systems Evaluation. Englewood Cliffs, NJ, USA: Educational Technology Publications, 2003.
[23] A. A. Kurt, E. Telli, S. Bardakcı, F. Sarsar, D. Orhan Göksün, and O. Filiz, "Dijital okuryazarlık ve yenilikçilik bağlamında öğretmenlerin Web 2.0 hızlı içerik geliştirme öz yeterlik inançları," Anadolu Journal of Educational Sciences International, vol. 12, no. 2, pp. 608–629, 2022, doi: 10.18039/ajesi.1014101.
[24] M. T. Üstündağ, E. Güneş, and E. Bahçivan, "Dijital okuryazarlık ölçeğinin Türkçeye uyarlanması ve fen bilgisi öğretmen adaylarının dijital okuryazarlık durumları," Journal of Education and Future, no. 12, pp. 19–29, 2017. [Online]. Available: https://dergipark.org.tr/en/pub/jef/article/332813
[25] Ö. Korkmaz, C. Arıkaya, and Y. Altıntaş, "Öğretmenlerin dijital öğretim materyali geliştirme öz-yeterlik ölçeğinin geliştirilmesi çalışması," Turkish Journal of Primary Education, vol. 4, no. 2, pp. 40–56, 2019. [Online]. Available: https://dergipark.org.tr/tr/pub/tujped/article/609625

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