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Evaluation of Digital Competencies of Teachers in Media Literacy and Critical Thinking Lesson based on European Union Science Centre's Digital Competence Framework for Teachers

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Abstract

Digital transformation has reshaped educational systems, requiring advanced digital competencies among teachers to manage technology-enhanced learning environments. Using the European Framework for the Digital Competence of Educators (DigCompEdu), this study examined tenth-grade Thinking and Media Literacy teachers' digital competencies across six domains: professional engagement, digital resources, teaching and learning, assessment, learner empowerment, and facilitating learners' digital competence. A descriptive-survey design was employed. The population included 570 teachers in Tehran's District 5; 231 were selected by simple random sampling. Data were collected using a researcher-developed questionnaire with established validity and high internal consistency. Descriptive statistics determined teachers' DigCompEdu proficiency levels. Teachers achieved the Explorer level in seven of 22 digital competencies, particularly in professional collaboration, digital resource management, digital content creation, and assessment-related practices, indicating areas requiring further professional development. In the remaining competencies, teachers demonstrated the Integrator level, reflecting their ability to incorporate digital technologies into classroom instruction without yet reaching advanced or innovative practice. At the domain level, teachers reached the Explorer level only in assessment, whereas the other five domains were at the Integrator level. Overall, findings suggest that although teachers possess a solid foundation of digital competence, further development is needed to reach the Expert and Pioneer levels defined by DigCompEdu. The study underscores the importance of sustained professional development, particularly in digital assessment, innovative instructional design, and learner-centered digital pedagogy, to support digital transformation in schools.

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Extended Abstract

Introduction

The rapid expansion of digital technologies has fundamentally transformed educational systems and redefined teachers' professional roles. Beyond simply using technological tools, teachers are now expected to design meaningful digital learning environments, facilitate student engagement, employ technology-supported assessment, and cultivate learners' own digital competencies. Consequently, digital competence has become one of the essential professional competencies required for effective teaching in the twenty-first century. The European Framework for the Digital Competence of Educators (DigCompEdu) provides one of the most comprehensive models for evaluating teachers' digital competence. The framework conceptualizes digital competence across six interconnected domains and twenty-two specific competencies, while classifying educators into six progressive proficiency levels ranging from Newcomer (A1) to Pioneer (C2). Thinking and Media Literacy is a curriculum area in which digital competence is particularly important because teachers are expected not only to integrate digital technologies into instruction but also to foster students' critical, ethical, and responsible engagement with digital media. Accordingly, this study aimed to assess the digital competence of tenth-grade Thinking and Media Literacy teachers based on the DigCompEdu framework and identify areas requiring professional development.

Method

This study employed a descriptive-survey research design. The statistical population consisted of 570 tenth-grade Thinking and Media Literacy teachers working in District 5 of Tehran. Using simple random sampling, 231 teachers were selected to participate in the study. Data were collected through a researcher-developed questionnaire designed according to the six competence domains and twenty-two competencies of the DigCompEdu framework. The instrument demonstrated acceptable content validity based on expert review and high internal consistency. Descriptive statistical methods were used to determine teachers' competence levels across both individual competencies and broader competence domains. Teachers' performance was interpreted according to the DigCompEdu proficiency levels, enabling identification of strengths and areas requiring further professional development.

Results

The findings revealed an uneven distribution of teachers' digital competence across the DigCompEdu framework. Among the twenty-two competencies, teachers reached the Explorer level in seven competencies, particularly those associated with professional collaboration, digital resource management, digital content creation, and technology-supported assessment. These competencies represent areas where teachers demonstrate initial adoption of digital technologies but require additional support to integrate them systematically into instructional practice. For the remaining competencies, teachers achieved the Integrator level, indicating that digital technologies are used purposefully in teaching and learning but are not yet employed in highly innovative or transformative ways. This suggests that most participants have moved beyond basic technology adoption and are capable of integrating digital tools into routine educational practice. At the domain level, assessment emerged as the weakest area, with teachers remaining at the Explorer level. In contrast, the domains of professional engagement, digital resources, teaching and learning, learner empowerment, and facilitating learners' digital competence all reached the Integrator level. These findings indicate that while teachers have developed satisfactory

competencies in instructional uses of digital technologies, significant challenges remain in employing digital assessment strategies that effectively monitor and support student learning.

Discussion and Conclusion

The findings indicate that teachers possess a solid foundation of digital competence but have not yet achieved the advanced proficiency required to fully exploit the educational potential of digital technologies. Their predominance at the Integrator level suggests meaningful classroom integration of technology; however, limited competence in digital assessment highlights an important gap in contemporary teaching practice. Digital assessment requires competencies extending beyond technological literacy to include data-informed instruction, formative assessment, personalized feedback, and continuous monitoring of student progress. Consequently, strengthening teachers' competence in this domain should become a priority for professional development initiatives. The results also suggest that professional learning programs should move beyond basic technology training toward developing advanced pedagogical competencies associated with the Expert and Pioneer levels of the DigCompEdu framework. Such programs should emphasize innovative instructional design, technology-enhanced assessment, collaborative professional learning, and learner-centered digital pedagogy. Overall, this study provides empirical evidence regarding the current status of teachers' digital competence within the DigCompEdu framework and offers practical guidance for educational policymakers, curriculum developers, and teacher educators seeking to support digital transformation in schools. Strengthening teachers' digital competence will not only improve instructional quality but also enhance students' digital literacy and readiness for learning and participation in an increasingly digital society.

Author Contributions: In this study, the first author was responsible for designing the research plan, data collection, analysis and interpretation of findings, and writing the manuscript. The second author, as a corresponding author, contributed to content collection, overall research review, collaboration in findings interpretation, and finalizing manuscript revisions. Overall, the conclusion and interpretation of the findings were conducted jointly through discussion and mutual exchange of ideas between both authors.

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AI Use Statement: In preparing this article, the authors used the large language model ChatGPT solely to improve the readability and language of the manuscript. All outputs generated by this tool were carefully reviewed, revised, and edited by the authors. The authors take full responsibility for the accuracy, originality, and final content of the article.

Ethical Approval: Given the descriptive-survey and non-interventional nature of the study, and in accordance with the university regulations in effect at the time of its implementation, obtaining an ethics approval code was not required. Respondents participated voluntarily and provided informed consent. The confidentiality of their information and the anonymity of their responses were maintained throughout the study. Furthermore, all stages of the research were conducted in accordance with established research ethics principles.