Education and Science

Original Article

2025 Supplement 1 173-193

Examining the Experiences of Visual Arts Teacher Candidates in Developing Digital Assessment Tools

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Abstract

The integration of digital assessment tools into the educational process emphasized the significance of assessing the knowledge and skills of teachers and teacher candidates in designing, utilizing, and benefiting from these tools. Therefore, it is very important to analyze the competencies of final-year teacher candidates who will serve as teachers in visual arts education, an essential area within education. This study aims to reveal the experiences of senior visual arts teacher candidates in designing digital assessment tools. Designed as a case study, which is one of the qualitative research methods, the present study employs a single-case design. Participants were selected through criterion sampling, a purposive sampling method. The criteria for participation included being a senior undergraduate student, volunteering to participate, and having completed the courses "Visual Arts Education Programs", "Material Design in Visual Arts Teaching", and "Assessment and Evaluation in Education" within their degree program. This study was carried out with 26 visual arts teacher candidates (21 female and 5 male) studying in the Department of Art Education at a state university in Türkiye. Data collection was performed using digital assessment tools designed by the participants, besides the structured interview forms. Before the application, participants received an introductory briefing on the identified digital assessment tools and their integration into visual arts education, based on a review of the literature. Participants were given the freedom to choose the digital platform they would use and were tasked with designing a digital assessment tool. After a three-week preparation period, the visual arts teacher candidates who had designed digital assessment tools were asked, "Would you use digital assessment tools in Visual Arts lessons when you become a teacher? Why?" The collected data were categorized under specific themes and subcodes, with participants coded as K1, K2, K3, …. Data analysis was conducted using the qualitative data analysis software MAXQDA, resulting in tabular, visual, and descriptive interpretations. It was observed that participants designed digital assessment tools aligned with the learning areas and achievements

Keywords

Digital transformation in education

Digital assessment and evaluation

Web 2.0 technologies

Visual arts teacher candidate

Article Info

Received: 10.05.2024

Accepted: 12.30.2024

Published Online: 03.03.2025

DOI: 10.15390/EB.2025.14097

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of the Visual Arts Course Curriculum. It was found that participants predominantly preferred 5th-grade middle school level in their digital assessment tool designs. Among the learning areas in the Visual Arts Course Curriculum, the most frequently addressed achievements were related to "Cultural Heritage", and the Wordwall digital platform was the most commonly utilized tool. Grouping was the preferred question type for the assessment tools. All participating visual arts teacher candidates expressed their intention to use digital assessment tools as teachers but noted facing challenges due to a lack of technical knowledge during the preparation process. This research highlights the need for similar studies involving larger groups and deeper investigations. Accordingly, the present study recommends conducting long-term studies to monitor the development of a higher number of participants, investigating the challenges visual arts teacher candidates face in technology usage, and exploring additional digital application examples for use in visual arts education.

Introduction

The widespread use of digital technologies in education has led to innovative changes in assessment methods. These innovative approaches, which have replaced traditional methods, offer educators flexible, rapid, repeatable, sustainable, and customizable solutions. Digital assessment methods better address the individual needs of students with diverse learning styles and paces. Schools provide teachers with opportunities to monitor and analyze students' performance. Moreover, digital assessment tools support decision-making by gathering evidence-based data. Digital tools and platforms enrich learning processes and facilitate effective learning. In this context, digital assessment, which supports student-centered learning approaches and aims to enhance the quality of teaching, emerges as a significant topic. The reflection of changes in educational technologies on assessment methods has become a critical area of research across academic communities. Digital assessment, which enables a deeper understanding of individual differences and offers personalized feedback, goes beyond traditional paper-based exams by providing varied, rich, and dynamic methods. Online exams, e-portfolios, game-based learning applications, and digital feedback tools are among the primary instruments used in assessment processes. These new approaches to assessment provide a flexible framework, allowing teachers to monitor their students in real time and intervene when necessary. The 2001 CEO Education and Technology Forum emphasized that as schools integrate technology into their curricula, assessment methods should reflect the tools used in learning (as cited in Bennett, 2002, p. 8). A widely held belief is that educational experiences in many schools fail to prepare students for the future. Many educators, business leaders, and government officials argue that combining learning processes with the application of new information technologies and structuring knowledge-based education systems plays a vital role in creating knowledge-rich societies (Patru & Khvilon, 2007, p. 8). Digital platforms offer an alternative learning environment in education and incorporate alternative assessment and evaluation processes. Conducting learning processes through these tools aligns with contemporary, student-centered education and constructivist approaches. Hiltz and Turoff (2005) described this innovative approach as "*Online learning is a new social process that is becoming a complete alternative to both distance education and traditional face-to-face education*" (p. 60).

Interest in national strategies for e-learning, incentives provided by entrepreneurial initiatives supporting learning, and the potential of digital tools and technologies that support student-centered personalized learning forms has steadily increased throughout the first decade of the 21st century (JISC, 2008, p. 5). Studies emphasizing the positive impact of Web 2.0-based digital platforms on the learning process and their role in enriching educational environments support this growing interest (Almalı & Yeşiltaş, 2020; Çelebi & Satırlı, 2021; Çelik, 2020; Dellos, 2015; Elmas & Geban, 2012; Eren, 2015; Gürbey & Büyük, 2024; Horzum, 2007; Lee & McLoughlin, 2007; Maraşlı & Değirmencioğlu, 2023; Thompson, 2007; Wang & Lieberoth, 2016; Yılmaz, 2017). Similarly, studies focusing on the use and impact of digital environments in visual arts education indicate increasing interest in this area (Çetgin, 2021; Dilmaç, 2019; Dilmaç & Karabacak, 2023; Sürek, 2021). Even though the integration of digital tools into education offers significant advantages, it also brings certain challenges. These challenges include inadequate technical infrastructure, disparities in digital skills, privacy concerns, and data security issues (Bennett, 2002; Bennett, 2014). Nonetheless, incorporation of technology into the teaching and learning process is inevitable. Keeping up with these advancements is essential for identifying what and how students learn and for documenting achievement (Bennett, 2002, p.14). Patru and Khvilon (2007) argued that this phenomenon, which challenges the education system, requires rethinking how the teaching-learning process and educational curricula should be transformed to equip students with appropriate skills in dynamic, information-rich, and constantly evolving environments. Teacher training institutions must assume a leadership role in transforming education; otherwise, they risk being overwhelmed by rapid technological changes (pp. 5-6). Ensuring that future teachers are prepared to utilize new tools for learning is critical. In this regard, it is vital to enhance the digital skills of both teachers actively working in educational institutions and pre-service teachers studying in higher education. Teacher training programs should offer technology-enriched experiences throughout their curricula. One of the principles identified by the community of information technology and teacher education for improving teacher training is integrating technology across the entire teacher education program. Pre-service teachers should learn to use technology and incorporate it into their teaching practices. Simply treating technology as a single course or method will not prepare teachers to effectively integrate it into their classrooms. The rapid and widespread inclusion of technology in schools necessitates a new generation of leaders who understand the importance of integrating technology into instructional processes and use emerging technological tools to enhance productivity and decision-making processes (Bünül, 2019; Mishra & Koehler, 2006; Patru & Khvilon, 2007). Training new-generation teacher leaders who can effectively utilize digital platforms in learning environments created through the integration of technology into education is as critical in arts education as in other disciplines. Digital tools provide opportunities for multidimensional evaluation of students' artistic abilities, creativity, aesthetic understanding, and cognitive processes. Online exhibitions, digital assessment tools, interactive evaluation platforms, and digital portfolios are commonly used in art education. Digital portfolios, in particular, enable educators to monitor students' artistic development and foster their artistic confidence. As stated by Jones-Woodham (2009), e-portfolios establish conceptual frameworks surrounding the art-making process, allowing students to engage in problem-solving, analysis, and reflection while collaborating on each other's work. Digital portfolios facilitate both process- and product-oriented evaluation by collecting students' artistic works over different periods in a digital environment (p. 92). Such portfolios enable teachers to analyze students' creativity, technical skills, and artistic progress in greater detail. They also assist teachers in evaluating instruction effectively and making evidence-based decisions that are difficult to assess with traditional paper-and-pencil tests (Richmann, 2000, p. 26). Online exhibitions provide students with opportunities to have their work evaluated not only by teachers but also by peers and even art professionals, while reaching a global audience. Digital assessment tools, which allow for quick and effective feedback on student work, contribute to the development of artistic talents and technical skills. Tools offering various feedback

formats, such as visual and auditory notifications, engage students in thinking deeply about topics such as art, artwork, and elements of art. Moreover, the tendency of students to spend significant time on digital electronic devices positively influences their engagement in lessons (Dilmaç & Karabacak, 2023, p. 215).

Previous studies indicated that teachers need additional support and training to develop competencies in utilizing next-generation assessment and evaluation tools. The digital transformation in education, particularly during the pandemic, has made it inevitable for teachers to acquire skills in technology use. This transformation triggered critical inquiries regarding the use of new-generation technologies by teachers and teacher candidates, their integration into curricula, the ability to utilize digital assessment and evaluation tools, and teacher training policies (Avcı, 2015; Çavuş, 2024; Özek & Sincer, 2024; Talan & Batdı, 2022). In this context, the inclusion of online and hybrid learning in the education system to meet modern learning needs and support effective preparation for life has become a significant issue for higher education institutions. Key topics include digital literacy, assessment and evaluation, teacher competency, and student well-being (Özek & Sincer, 2024, p. 1177). The Ministry of National Education (2018) also emphasizes in the Visual Arts Curriculum the necessity of adopting maximum diversity and flexibility in the assessment and evaluation process, underscoring that teachers play a critical role in ensuring the effectiveness of these practices (p. 6). Black and Browning (2011) stated the importance of adequately preparing art education teachers and teacher candidates to integrate technology into the educational process (p. 21). Interactive digital materials provide students with numerous opportunities for repetition and experiential learning. These materials, not limited to school settings, serve as important tools in blended learning by offering environments where students can repeatedly experience the acquired knowledge through different scenarios (Günaydın & Kurt, 2021, p. 13). Thanks to these features, digital platforms not only create effective learning environments but also incorporate alternative assessment and evaluation processes. In this regard, it is very important to identify the experiences of teacher candidates in designing and developing digital assessment tools (Çelik, 2021; Çelik & Tepe, 2022; Çukurbaşı & Kıyıcı, 2018). Digital teaching materials have also significantly influenced visual arts education by offering greater flexibility and creativity to both teachers and students. The use of technology in visual arts education is increasingly critical. Fine arts teachers must stay up-to-date and acquire the ability to follow advancements in their field (Avcı, 2015, p. 881).

The inherent abstract and production-oriented processes of art education can be measured in a more concrete, systematic, and objective manner through digital assessment tools, surpassing the limitations of traditional evaluation methods and making learning achievements more comprehensively visible. The gamification of innovative digital assessment tools, which render artistic learning processes motivating, interactive, and enjoyable, increases student engagement and enriches the learning environment. Gamification, as defined by Deterding, Dixon, Khaled, & Nacke (2011), involves the application of game design elements in non-game contexts (p. 10). When integrated into digital assessment tools, particularly in an online setting, gamification enhances students' learning experiences and encourages them to improve their artistic skills. Gamified digital assessment tools make learning processes more engaging and enjoyable for students, giving them the sensation of playing a game while completing tasks, which significantly boosts their motivation. This approach fosters more active participation in classes and provides better and more creative learning environments compared to traditional schools. These tools enable students to reimagine themselves in new worlds, achieving both entertainment and deep learning simultaneously (Bennett, 2014; Gee, 2003; Gürbey & Büyük, 2024; Yıldırım, 2023). While completing assigned tasks, students earn points through gamified interactions, fostering a healthy sense of competition and creating a dynamic learning experience. Gamified assessment tools also encourage risk-taking, trial-and-error approaches, and the development of innovative solutions. These tools can be implemented as educational games designed to teach specific knowledge in art history or artistic techniques, helping to prevent boredom associated with traditional assessment methods. In this context, the effective use of digital technologies, the development of digital

skills, and the integration of digital tools into educational processes are of critical importance for enhancing the digital literacy levels of both teachers and students. When designed appropriately, gamified digital assessment tools can serve as an effective learning resource in Visual Arts courses. Existing literature on the use of technology in visual arts education primarily focuses on the context of digital art and the utilization of technology in artistic practices (Avcı, 2015; Bora, 2018; Dolunay, 2016) or on e-portfolio applications as tools for evaluating artistic works (Alan, 2014; Mamur, 2015). However, there is a lack of research on the knowledge and competencies of visual arts teacher candidates in designing and utilizing digital assessment tools. Studies have highlighted both the benefits of technology use in visual arts education for teachers, the challenges posed by insufficient hardware and infrastructure, and the importance of teachers' digital skills and competencies (Cuya & Kuru, 2023; Zor, 2006).

Diaz and Ioannou (2019) emphasize the complexity of deciding which technologies to use, when to use them, how to integrate them into educational practices, and what achievements to expect, given the vast diversity of available technologies for supporting teaching and learning (as cited in Ioannou, 2021, p. 142). For the successful implementation of digital assessment, it is essential for teachers to continually update their digital pedagogical knowledge and skills, while students must acquire the necessary competencies to effectively utilize digital tools. Therefore, assessing the current state of teacher candidates, identifying their technology profiles, and evaluating their knowledge and experience are crucial steps. An examination of relevant literature reveals numerous studies conducted in different areas of education in Türkiye, yet research on the use of digital assessment tools in visual arts education remains limited. This gap underscores the originality of this research, which aims to address the lack of studies in the field and provide insights for future research. This study, expected to serve as a guide with its findings, investigates the process by which voluntarily participating visual arts teacher candidates design digital assessment tools aligned with the objectives of the Visual Arts Course Curriculum.

1. What is the distribution of the digital assessment tools designed by the participating visual arts teacher candidates in terms of school level, grade level, learning domain, and learning achievements?
2. Which digital assessment platforms did the participating visual arts teacher candidates predominantly utilize during the process of designing learning activities?
3. What are the views of the participating visual arts teacher candidates regarding their likelihood of using digital assessment tools once they become teachers?

Method

The present study was designed as a single-case study, one of the qualitative research methods. Case studies are regarded as a distinctive approach used in addressing scientific questions (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2014, p. 21). It is a qualitative approach in which the researcher collects detailed and in-depth information through multiple sources of evidence about real-life, contemporary, limited systems (a case) or multiple bounded systems (cases) and develops case descriptions or themes (Creswell, 2021; Yıldırım & Şimşek, 2021). Based on this approach, this study aims to determine the existing situation comprehensively without generalization. As stated by Silverman (2018), generalizability is not an issue for some researchers who view qualitative research as entirely descriptive. In authentic case studies, there is no attempt to generalize beyond a single case or event or to develop theories (p. 85). Single-case designs include a single unit of analysis. Situations that have not been studied before can be examined using a single-case design. Investigating such cases is significant as it provides a foundation and guidance for future researchers (Yıldırım & Şimşek, 2023, p. 313). No prior studies have been identified regarding digital assessment tools with teacher candidates in the field of visual arts education. Therefore, this research, expected to serve as a reference, was designed using a single-case study design.

Participants

Case study researchers focus on ongoing, real-life situations to collect accurate information efficiently (Creswell, 2021, p. 100). Criterion sampling, a purposive sampling method, involves studying all cases that meet a predetermined set of criteria. These criteria can be defined by the researcher or derived from an existing list (Yıldırım & Şimşek, 2021, p. 120). The participants of this study were selected using the criterion sampling technique, a purposive sampling method. The aim of this sampling method is not generalization but rather to observe patterns emerging from diverse backgrounds. Selection criteria included being a senior student, having taken the courses "Visual Arts Education Programs", "Material Design in Visual Arts Teaching", and "Assessment and Evaluation in Education". Teacher candidates' prior knowledge and pedagogical coursework were considered essential for reflecting the existing situation. The research was conducted with 26 visual arts teacher candidates, including 21 females and 5 males, enrolled in the Painting and Crafts Education Department at a public university in Türkiye during the Fall 2024-2025 semester. Participation was voluntary.

Data Collection Tool

Qualitative data, characterized by well-structured, rich descriptions and detailed process explanations, is particularly compelling. More researchers from core disciplines and applied fields are transitioning to the qualitative paradigm from core disciplines and applied fields. Data derived from qualitative research possesses an inherent "irrefutability". Words structured around events or stories create a concrete, vivid, and meaningful framework for readers (including other researchers, policymakers, or practitioners) that is often more persuasive than pages of numbers (Miles & Huberman, 2019, p. 1). The researcher conducted data collection parallel to the design process. Design documents prepared by visual arts teacher candidates were collected and preserved.

Structured interview forms, another data collection tool, were compiled as written documents. These forms, developed with expert consultation, included the question, "Would you use digital assessment tools in Visual Arts classes when you become a teacher? Why?" The forms aimed to explore teacher candidates' perceptions of digital assessment tools, the focal point of the research. Collecting opinions on technology use involved examining course drafts that reflected technology use, observing examples, and reviewing their application. According to Patton (2014), gathering responses to open-ended questions allows researchers to capture and understand others' perspectives without being constrained by predetermined categories (p. 21).

Application Process

Before initiating the application phase, a meeting was held with volunteer teacher candidates to inform them about the purpose, scope, and implementation process of this study. Relevant literature, existing studies, and books were reviewed, and ten digital platforms were identified. These tools were chosen with input from a field expert, ensuring alignment with the principle of supervision throughout the planning and application process. In the first week, the candidate teachers were introduced to Kahoot, Learning Apps, Educaplay, Edpuzzle, Wordwall, WordArt, Canva, Google Forms, Quizizz, and Socrative digital platforms, accompanied by sample applications. The researcher explained how to plan designs and integrate digital assessment applications into the process in line with learning achievements. Subsequently, planning was carried out, and the preparation process began. Candidate teachers were tasked with designing an example of a digital assessment tool using the competencies outlined in the Ministry of National Education (MoNE) Visual Arts Curriculum. The emphasis was placed on utilizing digital platforms during their design process. To ensure the results reflected their existing digital skills, no directive was provided, and digital platforms were introduced solely for informational purposes. Candidates were free to use platforms they already knew or wanted to explore. The three-week application phase aimed to provide candidates with opportunities to demonstrate their

problem-solving skills. Throughout the design process, regular meetings (twice weekly) were held, and continuous communication was maintained to provide necessary feedback. At the end of the third week, a structured interview form was administered to the teacher candidates. All documents were collected and securely stored by the researcher.

Data Analysis

The data obtained from this study were descriptively interpreted by using inductive content analysis. In qualitative research, analyzing the meanings embedded in the data is a critical component of the process. Qualitative data analysis is often referred to as content analysis in the literature. Inductive analysis focuses on identifying concepts and themes emerging from the data itself as a method or approach (Yıldırım & Şimşek, 2021, p. 240). The raw data collected through qualitative research must be corrected, organized, and recorded. Field notes and audio recordings are transcribed into text and checked for accuracy. Verified data are then selected, simplified, summarized, and transformed. Coding, as part of the analysis, sharpens, organizes, and categorizes the data. Moreover, presenting extended texts in various forms of representation is a fundamental criterion for ensuring the validity of qualitative analysis (Miles & Huberman, 2019, pp. 9-11). As the initial phase of the analysis, interview reports of participant visual arts teacher candidates were transcribed into written documents using Microsoft Word. The dataset was reviewed, and general statements were identified based on the responses of the participant teacher candidates. Coding was conducted according to the concepts derived from the data. Related codes were grouped to form subcategories. These codes were independently created by the researcher and an expert. Subsequently, a comparison was made to consolidate the codes into a final list through consensus. Both coding lists were examined to determine the numbers of agreements and disagreements. Inter-coder reliability was calculated using the formula provided by Miles and Huberman (1994): Inter-coder Reliability = Agreement / (Agreement + Disagreement) × 100. The reliability value was calculated to be 88%. According to coding reliability standards, an inter-coder agreement of at least 80% is expected (Baltacı, 2017; Miles & Huberman, 1994; Patton, 2014). The data were tabulated, and frequency values were calculated using the qualitative data analysis software MAXQDA (2020). Visualizations, such as code maps, were created to aid interpretation. Tables and visual representations were descriptively analyzed. Selected quotes from the responses of participant teacher candidates, coded as P1, P2, P3, etc., were directly included in the analysis.

Ethical Principles, Reliability, and Validity

As stated by Angen (2000), the final word on validity is neither definitive nor obligatory for every study. Validity is categorized into two types: ethical and substantive validity. Ethical validity refers to questioning the moral assumptions, political and ethical impressions, and fair treatment of diverse voices underlying all research agendas. It should commit to the productivity of the research, generate new opportunities, raise new questions, and encourage new dialogues (as cited in Creswell, 2021, p. 250). In this context, ethical considerations were observed throughout the study. All rules specified by the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were adhered to. Ethical approval was obtained from the Social and Human Sciences Ethics Committee of Gazi University (10.09.2024/14). While flexibility in validity and reliability criteria is accepted in qualitative research to a certain extend, it is very important to avoid arbitrariness. In qualitative studies, validity refers to credibility and transferability, whereas reliability reflects the consistency of a phenomenon's explanation across multiple trials (Tutar, 2022, pp. 120-121). Substantive validity refers to understanding the subject matter, gaining insights from other sources, and documenting this process in the written work. Self-reflection contributes to the validity of the study. Insights gained from prior research form the basis for further inquiry. Written explanations should resonate with the target audience and be persuasive and compelling. In qualitative research, validity represents an attempt to evaluate the accuracy of findings, as defined by the researcher and participants. It involves a description provided by the author of the research report (Creswell, 2021, pp. 250-251). The foundation of the research lies in the findings from domestic and international literature. To establish credibility as a

qualitative research criterion, theoretical data, multiple data sources (data triangulation), the researcher's experiences, and interview notes were utilized (Tutar, 2022, p. 122). The study's credibility was supported through data triangulation (participant teacher candidates' digital assessment tool designs and opinions), prolonged engagement, researcher positioning (active participant observer in all stages of the implementation process), and expert opinions.

The identities of the participating visual arts teacher candidates and their institutions have been kept confidential. The written documents obtained from the teacher candidates were coded as K1, K2, K3, and so on. To ensure the validity of the data obtained from the responses given by the teacher candidates in the structured interview forms, direct quotations were included in the analysis process. Themes and codes were supported by direct quotations from the views of the visual arts teacher candidates. Patton (2014) states that direct quotations are the primary source of raw data in qualitative research. They reveal the depth of an individual's emotions, the way they organize their worlds, their thoughts about events, experiences, and fundamental insights (p. 21). The principle of "member checking" (Miles & Huberman, 2019, p. 282) was adopted in the analysis of the digital assessment tool design documents prepared by the visual arts teacher candidates and the interview form data, which constituted the subject of this study. The steps of data simplification, classification, and tabulation carried out by the researcher were supervised by an academic expert in the field throughout the planning and implementation phases of the study, and their opinions were considered. The processes of classifying, coding, and tabulating the data under specific themes were developed in agreement with two experts. To strengthen the credibility of the study's findings, the results of prior studies were reviewed, and a results report was created within a causal network framework with new and supplementary connections. The results obtained here support the validity of this study in terms of their applicability to other researchers working in similar contexts. Teachers working in schools and researchers can benefit from the results of this study in their own work.

Results

This section presents the results obtained from the analysis of the data obtained in the study. The results are organized as follows: the digital assessment tools used by participating visual arts teacher candidates when designing a learning activity; the distribution of these tools concerning school level, grade level, learning domain, and learning objectives; the digital assessment platforms predominantly used by participating visual arts teacher candidates in sample learning activities designed for Visual Arts courses to be used in online environments; and the views of the participating visual arts teacher candidates regarding their potential use of digital assessment tools once they become teachers.

What is the distribution of digital assessment tools designed by visual arts teacher candidates in terms of school level, grade level, learning area, and learning achievements?

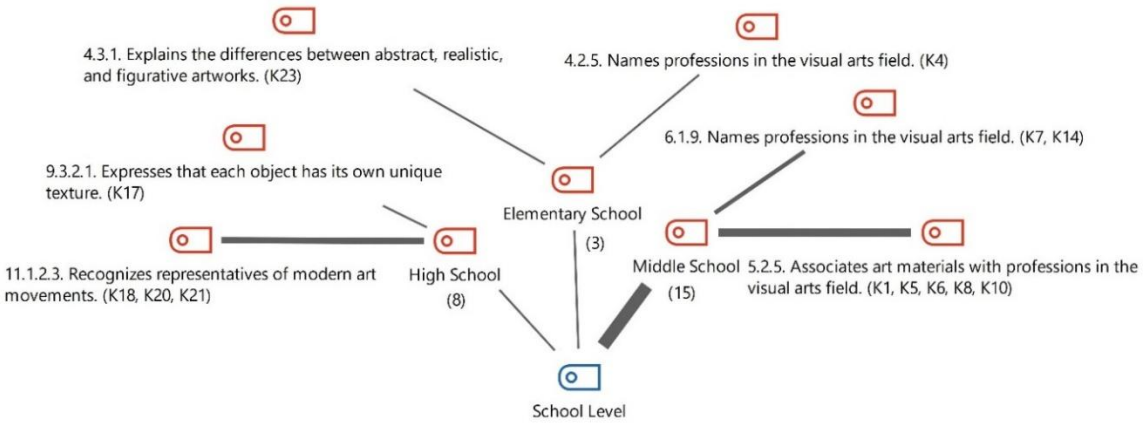

Figure 1. Distribution of school levels for digital assessment tools designed by visual arts teacher candidates

As seen in Figure 1, visual arts teacher candidates predominantly selected learning achievements from the middle school (15) Visual Arts Curriculum for the digital assessment tools they designed during a sample learning activity process. Figure 1 further shows that the candidates' second preference was high school level (8), followed by elementary school level (3). Among the most preferred middle school level achievements (15), candidates frequently selected the 5th-grade achievement "5.2.5" (5 instances), the sixth-grade achievement "6.1.9" (2 instances), and the high school-level 11th-grade achievement "11.1.2.3" (3 instances).

Table 1. Frequency and percentages of grade levels preferred by visual arts teacher candidates when designing digital assessment tools

Grade	f	Participating Teacher Candidate	%
5th	7	K1, K5, K6, K8, K10, K11, K26	26.92
7th	5	K2, K3, K9, K12, K16	19.23
6th	3	K7, K14, K15	11.54
10th	3	K22, K24, K25	11.54
11th	3	K18, K20, K21	11.54
4th	2	K4, K23	7.69
9th	1	K17	3.85
8th	1	K13	3.85
1st	1	K19	3.85
Total	26		100.00

Considering Table 1, it can be seen that the visual arts teacher candidates predominantly preferred the 5th-grade level (26.92%) when designing digital assessment tools. As seen in Table 1, the least preferred grade levels were 8th, 9th, and 1st grades (3.85%). The second most preferred level was 7th grade (19.23%), while 6th, 10th, and 11th grades (11.54%) were the third preference. Additionally, the 4th grade was selected at a rate of 7.69%, as shown in Table 1.

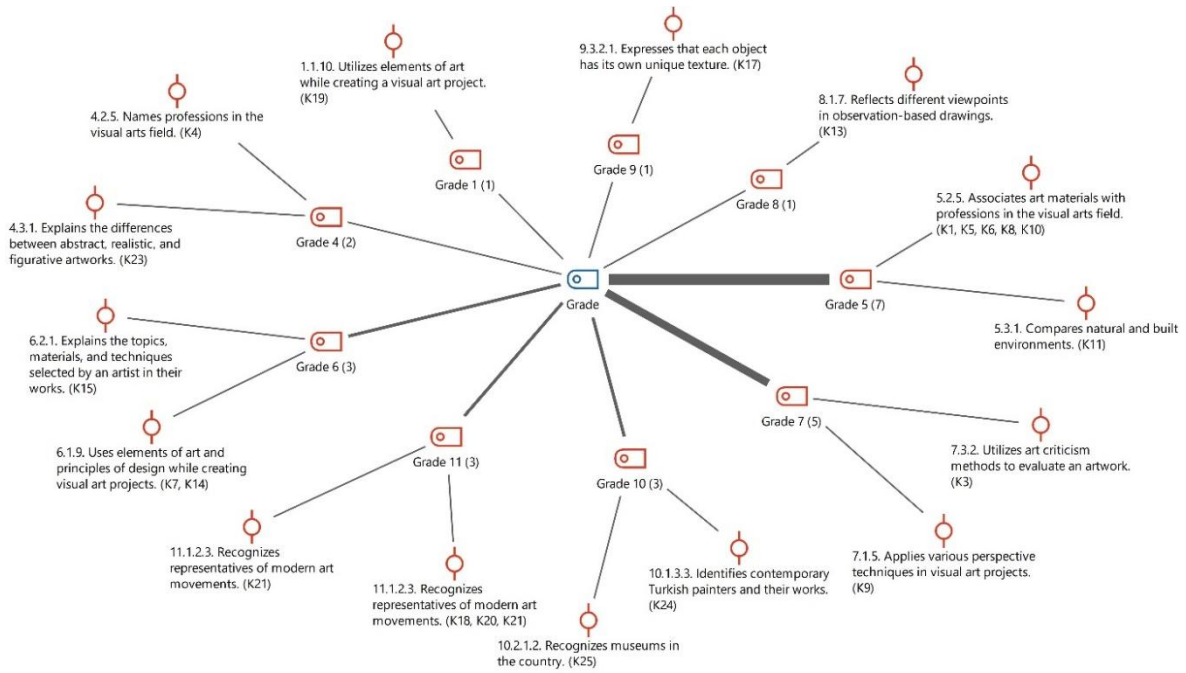

Figure 2. Distribution of grade levels and learning achievements in digital assessment tools designed by visual arts teacher candidates

As seen in Figure 2, visual arts teacher candidates most frequently preferred learning achievements from the 5th (7) and 7th (5) grades when designing digital assessment tools during a sample learning activity process. The most frequently chosen 5th grade achievement was "5.2.5. Relates art materials used to professions in the field of visual arts" (5 instances). Another frequently preferred achievement was the 11th-grade achievement "11.1.2.3. Recognizes representatives of modern art movements" (3 instances). Among the preferred achievements, the 6th-grade achievement "6.1.9. Utilizes elements of art and principles of design while creating visual art projects" (2 instances) ranked third, as shown in Figure 2.

Table 2. Frequency and percentages of learning areas preferred by visual arts teacher candidates when designing digital assessment tools

Learning Field	f	Participating Teacher Candidate	%
Cultural Heritage	11	K1, K2, K4, K5, K6, K8, K10, K15, K16, K22, K25	42.31
Visual Communication and Design	8	K7, K9, K12, K13, K14, K17, K19, K26	30.77
Art Critics and Aesthetics	7	K3, K11, K18, K20, K21, K23, K24	26.92
Total	26		100.00

Examining Table 2, it is evident that the participating visual arts teacher candidates predominantly selected the "Cultural Heritage" (42.31%) learning domain from the Ministry of National Education's (MoNE) Visual Arts Curriculum when preparing digital assessment tools. As seen in Table 2, the participants ranked "Visual Communication and Design" (30.77%) and "Art Criticism and Aesthetics" (26.92%) as the second most preferred learning domains, with a slight difference in percentages.

Which digital assessment platforms do the participating visual arts teacher candidates use predominantly during the process of designing learning activities?

Table 3. Frequency and Percentage of Digital Assessment Platforms Used by Visual Arts Teacher Candidates in the Learning Activity Design Process

Digital Assessment Platforms	f	Participating Teacher Candidate	%
Wordwall	10	K1, K3, K6, K10, K13, K16, K18, K19, K23, K26	38.46
Learning Apps	8	K4, K5, K7, K11, K12, K14, K15, K17	30.77
Google Forms	4	K20, K21, K24, K25	15.38
Interacty	3	K2, K8, K9	11.54
Kahoot	1	K22	3.85
Total	26		100.00

Table 3 demonstrates that the digital platforms most frequently utilized by the participating visual arts teacher candidates in the process of designing learning activities are "Wordwall" (38.46%) and "Learning Apps" (30.77%). Additionally, it is seen in Table 3 that the platforms less commonly employed by the participants, even though by a small margin, are "Google Forms" (15.38%) and "Interacty" (11.54%). The least utilized digital platform for preparing digital assessment tools by the visual arts teacher candidates was identified as "Kahoot" (3.85%).

Table 4. Frequency and Percentage Distribution of Question Types in Digital Assessment Tools Used by Participating Visual Arts Teacher Candidates

Type of Question	f	Participating Teacher Candidate	%
Grouping	7	K6, K10, K11, K16, K18, K23, K26	26.92
Matching	6	K4, K5, K7, K13, K14, K19	23.08
Multiple-Choice Test	6	K3, K9, K20, K21, K24, K25	23.08
Memory Games	5	K1, K2, K8, K12, K22,	19.23
Puzzles	1	K17	3.85
Short-Answer Quiz	1	K15	3.85
Total	26		100

Table 4 reveals that the most frequently designed assessment tools by the participating visual arts teacher candidates during the process of learning activity design were those employing the "grouping" question type (26.92%). It can also be seen that "matching" (23.08%), "multiple-choice tests" (23.08%), and "memory games" (19.23%) were also preferred assessment types. According to Table 4, the least preferred digital assessment tool question types were "short-answer quizzes" (3.85%) and "crossword puzzles" (3.85%).

Table 5. Distribution of Digital Assessment Tools Used by Participating Visual Arts Teacher Candidates According to Grade Level, Learning Domain, and Learning Achievements

Grade	Learning Field	Participating Teacher Candidate	Achievement	Digital Assessment Tool and Frequency
1, 5, 6, 7, 8, 9	Visual Communication and Design	K7, K9, K12, K13, K14, K17, K19, K26	6.1.9. (2); 7.1.5.; 7.1.2.; 8.1.7.; 9.3.2.1.; 1.1.10.; 5.1.7.	Learning Apps (4) Wordwall (3) Interacty (1)
4, 5, 6, 7, 10	Cultural Heritage	K1, K2, K4, K5, K6, K8, K10, K15, K16, K22, K25	5.2.5. (5); 7.2.1. (2); 4.2.5.; 6.2.1.; 10.2.1.2. (2)	Wordwall (4) Learning Apps (3) Interacty (2) Google Forms (1) Kahoot (1)
4, 5, 7, 10, 11	Art Criticism and Aesthetics	K3, K11, K18, K20, K21, K23, K24	7.3.2.; 5.3.1.; 11.1.2.3.(3); 4.3.1.; 10.1.3.3.	Wordwall (3) Google Forms (3) Learning Apps (1)

Given the results presented in Table 5, it can be seen that the visual arts teacher candidates participating in the study most frequently used the digital platforms "Learning Apps" (4), "Wordwall" (3), and "Interacty" (1) in designing digital assessment tools for the "Visual Communication and Design" learning domain. Regarding the achievements selected by the visual arts teacher candidates in this domain, it can be noted that the learning objective "6.1.9. Utilizes elements of art and principles of design in creating visual art works" from the Visual Arts Course Curriculum for the 6th grade was the most commonly chosen (2). As seen in Table 5, for the "Cultural Heritage" learning domain, the digital platforms preferred by the participants in designing digital assessment tools were "Wordwall" (4), "Learning Apps" (3), "Interacty" (2), "Kahoot" (1), and "Google Forms" (1), in order of frequency. In this domain, the frequently selected achievement was "5.2.5. Relates materials used in art to professions in the visual arts" from the 5th-grade Visual Arts Course Curriculum (5). As for the "Art Criticism and Aesthetics" learning domain, Table 5 shows that the participants most frequently utilized "Wordwall" (3), "Google Forms" (3), and "Learning Apps" (1) when designing digital assessment tools. The preferred learning objective in this domain was "11.1.2.3. Recognizes representatives of modern art movements" from the 11th-grade Visual Arts Course Curriculum (3).

What are the views of visual arts teacher candidates on using digital assessment tools once they become teachers?

The results regarding the views of the visual arts teacher candidates on the use of digital assessment tools in their future teaching practices, obtained through a structured interview form, revealed that all participants responded positively. The reasons for their positive views were summarized using a hierarchical code-subcode model, and these results were supported with direct quotes from the participants' statements.

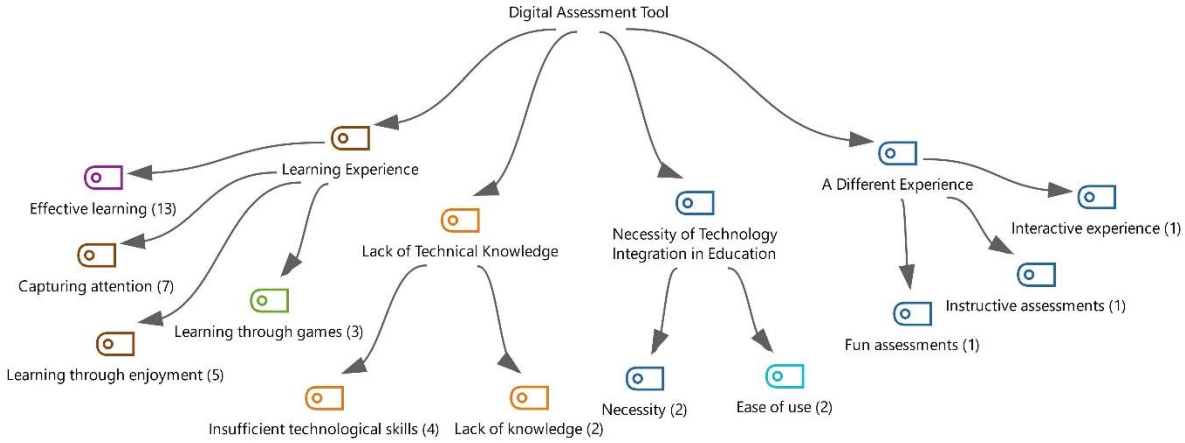

Figure 3. Hierarchical Code-Subcode Model Depicting the Reasons Visual Arts Teacher Candidates Plan to Use Digital Assessment Tools as Teachers

When examining Figure 3, it is evident that the participating visual arts teacher candidates predominantly expressed that they might use digital assessment tools in Visual Arts classes as teachers because they believe it would "facilitate effective learning environments" (13). The views of the participating teacher candidates are as follows:

> Participant K22: "*I would use it particularly for challenging topics. I think it would be beneficial for subjects that are difficult to learn*".

> Participant K17: "*I would use it because this way, I can reach every student*".

The figure further indicates that the participants believe digital assessment tools would "capture students' attention" (7) and "make learning enjoyable" (5), prompting them to consider their use in Visual Arts classes as teachers. Their statements include:

> Participant K4: "*I would use it. Especially because elementary school children love games, I think it would attract their attention*".

> Participant K2: "*I would use it because it allows them to learn in a fun way*".

Moreover, Figure 3 reveals that the teacher candidates expressed that digital assessment tools could enable students to have "a different experience" (3), "learn through games" (3), and benefit from their "ease of use" (2). The participants' statements reflect these views:

> Participant K3: "*I would use it in Visual Arts classes because it allows students to have an interactive experience while learning*".

> Participant K7: "*I would use it. Children would learn while playing games and have fun at the same time. Learning through fun would be more lasting*".

> Participant K10: "*I would use it. They would be assessed without realizing it's an exam. It would be fun for the students. It would be like a competition, making the assessment both entertaining and educational*".

> Participant K23: "*I would use it. It makes asking questions a bit easier*".

Figure 3 also highlights that the participants believe that digital assessment tools reflect the notion that "technology should be integrated into education" (2), although some pointed to their "technical knowledge deficiencies" (6) in this area. Their statements are as follows:

> Participant K25: "*Technology in education has become inevitable. As time progresses, accessing information through smartboards, tablets, and phones becomes easier. I would use a digital card game to reinforce learning through its questions*".
>
> Participant K26: "*I would use it. In this era of technological advancement, it is both easy to use and aligns with contemporary technology. It is more effective and more enjoyable*".
>
> Participant K21: "*I would use it. Overall, I didn't struggle much. At first, I wasn't sure how to design it, but later I managed. It would create excitement among students and facilitate their learning*".

Discussion and Conclusion

In this study, the digital assessment tool designs created by participating visual arts teacher candidates on digital platforms for the learning achievements of the Visual Arts Course Curriculum were examined. It was aimed to identify the experiences encountered by the participants during the process of designing sample digital assessment tools. This study, limited to 26 visual arts teacher candidates studying at a specific university, was designed to assess the current situation rather than generalize findings. It is anticipated that the results will serve as a resource for researchers and future studies. Elmas and Geban (2012) emphasize that Web 2.0 tools can enrich various courses and positively influence students' levels of technological literacy. They assert that the optimal impact of these tools requires alignment with the intended objectives and a thorough understanding of where and how to use them. Furthermore, they argue that enabling learners to engage in content creation related to the subject matter, rather than merely reading, hearing, or viewing information, contributes significantly to their learning process (p. 250). In this context, the present study suggests that this study raised awareness among prospective visual arts teachers, contributed positively to their professional development, and provided opportunities for experiential learning. While no similar studies have been conducted with visual arts teacher candidates, a comparable study with social studies teacher candidates reported that participants gained skills in using digital assessment tools, which gave them a competitive edge over their peers (Çelik & Tepe, 2022, p. 36).

Integrating digital literacy skills and digital technologies into the learning process in Visual Arts courses plays a crucial role in making the classes more efficient and effective. Digital portfolios, online exhibitions, digital feedback tools, and interactive assessment platforms stand out as significant tools in these processes. However, the effective use of such tools necessitates digital literacy and pedagogical alignment. When appropriately integrated, gamification can serve as a powerful tool to enhance student engagement and achievement in art education. Norton and Hathaway (2008) highlight the positive effects of using Web 2.0 tools in educational activities inside and outside classrooms in primary education settings in developed societies like the United States. Similarly, Atalmış and Şimşek (2022) found that teachers who received training on Web 2.0 tools demonstrated advanced skills in their usage. They emphasize the importance of supporting teachers in using Web 2.0 tools and restructuring educational programs to ensure their effective incorporation into lessons (as cited in Gürbey & Büyük, 2024, p. 35). The study observed that although the prospective visual arts teachers initially struggled with technical knowledge and skills deficiencies when designing sample digital assessment tools aligned with the aims and objectives of the Visual Arts Course Curriculum on Web 2.0-based digital platforms, they were able to create these tools through research and hands-on experience. Similarly, Çelik and Tepe (2022) reported that participants in their study faced challenges due to insufficient knowledge and skills regarding the digital platforms used for designing digital assessment tools but expressed satisfaction upon successfully completing the task. Dağ and Şahin (2024) also conducted a study with prospective elementary school teachers, describing their experiences, willingness to use Web 2.0 tools, and the difficulties they encountered (p. 548). The findings of this study align with similar research in the field.

The majority of participants in this study were female students. Research on the use of Web 2.0 tools suggests that girls tend to utilize these tools more frequently than boys for both social and academic purposes (Mazman & Usluel, 2011; OECD, 2009). This finding from the present study aligns with the results of previous research in the field.

It was observed that visual arts teacher candidates participating in this study predominantly preferred designing digital assessment tools for middle school students. High school was the second most frequently selected school level, while elementary school was the least preferred. In web-supported education, although students assume responsibility for their own learning, they may encounter certain issues during the process. Specifically, when technical problems arise, they often require the assistance of an adult to resolve these issues (Frank, Reich, & Humphreys, 2003, p. 68). For the course objectives to be achieved, it is essential for a competent adult to be available to address such challenges. Similarly, Süral and Girmen (2019) identified that, during the development and application of a digital assessment tool for the Life Sciences course, the majority of student participants lacked mouse-handling skills, leading to errors in drag-and-drop tasks. These authors concluded that the computer literacy levels of the students in the study varied significantly (p. 301).

Among the visual arts teacher candidates, it was determined that when designing sample digital assessment tools for use in Visual Arts courses, most preferred targeting 5th-grade middle school students. This was followed by 7th grade and then 6th grade. This result indicates that the candidates believe the targeted student group has a level of technological competence suitable for game-based question types at this grade level. Many studies emphasize that digital game-based learning is more effective and long-lasting for middle school students (Dilmaç, 2019; Maraşlı & Değirmencioğlu, 2023; Mayer, 2019; Karadağ & Garip, 2021; Karamustafaoğlu & Kılıç, 2020; Sürek, 2021; Taş, Coşkun, Ayverdi, & Bolat, 2023; Terzioğlu & Kurtuldu, 2024). Integrating this approach into the evaluation process, which is an essential component of learning, could enhance students' motivation and help them recognize their abilities. Game-based and gamification-driven assessment holds potential across education, healthcare, business, and sustainability sectors. This strategy makes assessment more interactive and engaging, thereby increasing participation, motivation, and learning achievements. Traditional methods, however, tend to be monotonous and demotivating. Gamification improves school learning achievements by transferring knowledge and skills in a dynamic way, encouraging engagement, making learning enjoyable, and enhancing student performance (Yıldırım, 2023, p. 133). The results achieved in this study suggest that visual arts teacher candidates perceive gamification-based digital assessment tools to be more effective.

It was also identified that while designing sample digital assessment tools for use in Visual Arts courses, the teacher candidates frequently focused on the "Cultural Heritage" learning domain of the Visual Arts Curriculum. The participants' preference for this domain could be attributed to its emphasis on topics such as the reflection and shaping of culture through art and art objects, the role of visual arts as a bridge between the past and the future, the examination of historical processes, and the exploration of Turkish culture. The domain's relevance to contemporary life also plays a significant role. This result is consistent with the results reported by Çelik and Tepe (2022), who revealed that teacher candidates often prefer learning achievements from the Social Studies Curriculum that are closely related to real-life contexts (p. 34).

Given the results achieved in this study, it can be stated that the participating visual arts teacher candidates predominantly preferred the Wordwall and Learning Apps digital platforms when designing sample digital assessment tools for use in Visual Arts courses. This result suggests that the visual arts teacher candidates who participated in this study were influenced by one another while solving the given problem, and they opted for these platforms because they are free, easy to use, and equipped with a simple, comprehensible interface. This result aligns with the study carried out by Elmas

and Geban (2012), which emphasized that even limited free versions of all grouped Web 2.0 tools should not be overlooked, as they can be easily and effectively utilized in lessons (p. 248). Moreover, previous studies indicate that activities organized on the Wordwall digital platform foster positive attitudes toward learning by leveraging its reward mechanism, enhancing students' knowledge and skills, and increasing peer interaction and active participation in lessons (Akay & Çakır, 2023; Elitok Kesici & Payza, 2022; Halamy, Kamarudin, & Mohsin, 2022; Taş et al., 2023). The platform's user interface prioritizes gamification over the traditional exam atmosphere, transforming the assessment process into an enjoyable experience. Furthermore, studies have shown that Learning Apps, a communication-focused Web 2.0 tool, supports effective and long-lasting learning. Studies carried out in Turkish language teaching highlight that this application engages students by inviting them to learn through its event- and game-oriented content (İnal & Arslanbaş, 2021; Karadağ & Garip, 2021). In this context, it can be argued that the experience gained by graduate-level visual arts teacher candidates through the use of the Wordwall and Learning Apps platforms within the scope of this study contributes significantly to their professional development. These rich applications, offering new learning environments, allow students to be assessed in an enjoyable manner without the stress of a traditional exam, which explains their preference. It was observed that the visual arts teacher candidates participating in the study viewed digital assessment tools not as traditional exam alternatives but as instruments to identify learning gaps, facilitate effective and enjoyable learning, and provide diverse experiences. Another platform used by the participants in designing digital assessment tools was Google Forms. This platform was reportedly preferred because it was widely utilized during the remote learning period of the COVID-19 pandemic. Additionally, the participants were observed to have used the Interacty digital platform. They were not limited to the platforms introduced to them but conducted independent research and experimentation with other tools. This result suggests that the research fostered a sense of curiosity and encouraged the visual arts teacher candidates to explore further. Lastly, it was found that Kahoot was the least preferred digital platform for designing digital assessment tools among the participants. This finding contrasts with results from studies in other educational fields. For instance, Çelik and Tepe (2022) reported that social studies teacher candidates predominantly preferred Kahoot and Nearpod, Gürbey and Büyük (2024) found that science teachers frequently used Canva among Web 2.0 tools, and Dağ and Şahin (2024) identified Kahoot as the top choice among elementary teacher candidates.

Within the scope of the study, it was determined that the digital assessment tools designed by the participating visual arts teacher candidates predominantly featured grouping, matching, and multiple-choice test formats. Bennett (2002, p. 14) highlights that the use of multiple-choice questions is particularly logical, noting that they can be presented on screens and require minimal computer skills to answer. The findings indicate that the participating visual arts teacher candidates designed digital assessment tools with consideration for students' gaming motivation. They also preferred game-based tools, such as memory games and crossword puzzles, as question types. Redecker (2013) emphasizes that these games offer an interesting and engaging alternative to traditional formative assessment formats, enabling personalization by allowing students to play at their own competency levels (p. 43). Based on the findings of the study, it was concluded that the participating visual arts teacher candidates utilized various digital question types, considering the digital competencies and computer usage levels of their target students. This result aligns with findings from studies conducted with teachers and teacher candidates (Çakan, 2004; Çelenk & Tatlı, 2022; Önel, Dalkılınç, Özel, Deniz, Balkaya & Birel et al., 2020).

The visual arts teacher candidates frequently selected the following learning achievements from the Visual Arts Course Curriculum: for the "Visual Communication and Design" learning area at the 6th-grade middle school level, the achievement "6.1.9. Uses art elements and design principles while creating visual art works"; for the "Cultural Heritage" learning area at the 5th-grade middle school level, the achievement "5.2.5. Relates the materials used in art with professions in the field of visual arts"; and for the "Art Criticism and Aesthetics" learning area at the 11th-grade high school level, the achievement "11.1.2.3. Recognizes the representatives of modern art movements". It can be inferred that these achievements were chosen with the intention of connecting them to real-life contexts and teaching complex theoretical knowledge in the most effective and enjoyable way possible. Çetkin (2021), in a study on the use of Web 2.0 tools in Visual Arts courses, found that Kahoot, a competition-format application, was particularly effective for assessing learning levels in theoretical topics. The study concluded that students had an enjoyable learning-assessment experience and that the activity proved to be an effective learning tool (p. 678).

Considering the results achieved in this study, it was determined that the participating visual arts teacher candidates held positive opinions about using digital assessment tools in Visual Arts classes once they become teachers. The opinions of the teacher candidates align with the results reported in previous studies (Erden & Uslupehlivan, 2020; Özer & Albayrak Özer, 2017). On the other hand, the participants reported initial difficulties due to their perceived lack of knowledge about digital applications during the first weeks. This struggle experienced by the teacher candidates was also observed by the researcher during the design process. However, as the study progressed, the participants expressed joy at the success they achieved with the design examples they created and stated that they would enjoy using such tools in their future teaching practices. Integrating the design, preparation, and application of digital materials into the content of professional field courses offered by teacher education programs is a 21st-century necessity. The challenges faced by teacher candidates due to their lack of knowledge, which this study identified as an important finding contributing to their professional development, are consistent with the results of studies carried out in other areas of education (Çelik & Tepe, 2022; Dağ & Şahin, 2024 Gürbey & Büyük, 2024; Saraçoğlu & Kocabatmaz, 2019). Liu (2008) emphasizes that instructors' proficiency in utilizing technology significantly impacts the quality of teaching. He further highlights the challenges educators face in keeping up with advancements in technology and, more importantly, in understanding how to use technology in ways that make a meaningful difference in student interactions (p. 9).

The present study revealed that the participating visual arts teacher candidates predominantly expressed their intention to use digital assessment tools in the Visual Arts learning process to create effective learning environments once they become teachers. Additionally, the candidates indicated that they might use digital assessment tools because they believed such tools would engage students, facilitate enjoyable learning experiences, promote learning through games, and provide diverse experiences. Despite their shared belief in the importance and necessity of integrating technology into education, the participants were found to have insufficient knowledge about digital assessment tools. Previous studies on teacher candidates' perceptions of the educational contributions, necessity, and use of Web 2.0 tools align with the results of this study (Dağ & Şahin, 2024 Elitok Kesici & Payza, 2022; Erden & Uslupehlivan, 2020; Özer & Albayrak Özer, 2017; Qarkaxhja, Kryukova, Cherezova, Rozhnov, Khairullina, & Bayanova, 2021; Taş et al., 2023; Tatlı & Akbulut, 2017). These studies reported results that support one another.

Limitations and Suggestions

The results of this study revealed a lack of awareness among visual arts teacher candidates regarding digital-based learning activities and the diversity of digital assessment tools, as well as insufficient technical knowledge in these areas. However, as this research is limited to 26 participants, it highlights the need for more extensive studies with larger groups and longer durations to observe developmental progress over time. A large-scale study focusing on final-year students in visual arts education programs could significantly contribute to the literature by assessing their current state.

Therefore, it is recommended to conduct research involving fourth-year visual arts teacher candidates from different universities' education faculties, using interviews and focus group discussions to examine their cognitive processes and pedagogical approaches to digital tools in deeper detail. The present study, which involved 21 female and 5 male participants, suggests the need for future research with more balanced and evenly distributed gender representation to evaluate the impact of such diversity on the findings.

The challenges identified in technology use among the visual arts teacher candidates in this study should be explored in depth with larger participant groups. Further studies could investigate the digital literacy levels, knowledge, and skills of visual arts teacher candidates from various regions in using technology. Studies could also be carried out to examine additional digital applications that can be utilized in visual arts education beyond the platforms preferred by participants, such as Kahoot, Learning Apps, Wordwall, Google Forms, and Interacty.

The results of this study could serve as a resource for future research and training programs designed to address the current state of digital assessment tools and their application in education. Qualitative and quantitative studies using digital assessment tools with larger groups across different educational fields are also recommended. Experimental studies could compare the potential uses of digital assessment tools and determine their impact on learning achievements through practical applications.

It is proposed to include practice-based training on the use of digital assessment tools and digital platforms in course content for visual arts teacher candidates studying in education faculties.

Experimental studies could also evaluate the effectiveness of digital assessment tools on students across all educational levels, from preschool to higher education. Moreover, qualitative, quantitative, or mixed-method research could explore students' attitudes toward digital assessment tools at various age levels.

This study, carried out with visual arts teacher candidates, underscores the need for similar research involving in-service visual arts teachers. Extensive qualitative or quantitative research could investigate the use, opinions, and preferences of visual arts teachers regarding digital platforms. In the context of an education system undergoing digital transformation, it is crucial to support the professional development of in-service visual arts teachers through in-service training on how to effectively integrate technology into their lessons. Experts in the field could provide theoretical and practical training on the planning, preparation, and use of digital assessment tools. Teachers could also be involved in the development of these tools. Furthermore, seminars, meetings, conferences, or workshops could be organized to raise awareness among teachers and teacher candidates about the integration of digital technologies into education.

Seminars, workshops, and meetings can be organized to introduce all faculty members to digital learning, digital assessment, and digital platforms in higher education institutions, particularly within faculties of education that play a crucial role in teacher training. Comprehensive studies can be carried out to assess the digital competencies of academics, and based on the results, practical projects can be implemented to enhance these competencies.

Collaboration with relevant institutions can be established to improve funding and technological infrastructures, which play a pivotal role in enabling teachers, teacher candidates, and academics to stay abreast of innovations brought about by digital transformation in education, as well as to adopt and integrate current advancements effectively.

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