ISBN: 978-628-95207-8-1. ISSN: 2414-6390. Digital Object Identifier: 10.18687/LACCEI2024.1.1.1495

Gender Disparities in Digital Technology Engagement: A Study of Student Participation in Art Classes

Case study: Department of Art Education, Graphic and Design, Abai Kazakh National Pedagogical University
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Abstract: ***Given the role of digital technologies in education, understanding the increasing importance of the level of participation of female and male students in using these technologies is essential. This study aims to quantitatively examine the extent of participation of female and male students in using digital technologies and explore the role of familiarity with these technologies in increasing or decreasing participation. This study was conducted through a descriptive and self-assessment approach among art students. For this purpose, a questionnaire about three dimensions of emotional, behavioral, and cognitive participation was designed. The participants were 20 graduate art students at the university under study. The results indicated that the familiarity of female students with digital technologies used in art education is less than that of male students. Familiarity with digital technologies can significantly impact the increase or decrease in emotional participation in both genders. Also, the lack of knowledge can enhance female students' motivation for greater cognitive participation. Female students demonstrated higher cognitive participation, and male students showed higher emotional participation, but the overall average participation in both genders was equal. Nevertheless, studying the role of gender stereotypes in the level of awareness and participation of female students is crucial for future research.***

Keywords: Gender Disparities, digital technologies, student engagement, Art classes.

I. INTRODUCTION

The widespread use of digital technologies in daily life and education has led many researchers to show a growing interest in this subject. For instance, [1] and [2] examined technologies from the students' perspective, assessing their usefulness or non-usefulness. Moreover, recent studies have indicated that digital technologies can significantly support student engagement if they are consciously and appropriately utilized [3].

Blended learning combines thoughtful integration of face-to-face and online learning experiences. In this teaching approach, digital technologies are incorporated with traditional instructional materials in the classroom. Since integrating technology in the classroom engages educators and students in novel processes, students need to master the timing, location, flexibility of learning, and pace of learning [4]. Encouraging students to participate more in blended learning environments is crucial, as student engagement is a prerequisite for successful learning [5]. However, strategies to enhance student participation in traditional and technology-based education differ, and strengthening student participation and maintaining their motivation in technology-enhanced learning may pose challenges [6]. Based on this, many researchers have focused specifically on student participation in technology-enhanced educational environments [7,8].

Student participation is one of the most crucial indicators of learning quality. For years, participation has been considered a significant factor in preventing dropout and promoting more tremendous success. In today's educational landscape, where digital technologies are finding their place in art education, a blended learning approach replaces traditional teaching methods. Integrating digital technologies in the classroom and encouraging students to engage with these technologies actively are essential. Student participation involves the energy and effort students invest in their classroom and learning experiences, manifested through various behavioral, cognitive, or emotional indicators that form an assessable chain. Internal and external factors can influence participation, including interactions with other students and instructors, learning methods, and the learning environment.

[9] found that the classroom atmosphere and interactive engagement with peers directly impact students' positive participation. Other research has also indicated that regardless of environmental factors such as class size, student participation in the classroom is associated with a positive perception of relationships with peers and instructors, as well as respect and mutual connection [10, 11, 12].

In addition to environmental variables (such as class size) and interpersonal factors (such as relationships), variables such as gender, cognitive gender, and personality may influence student participation. When considering student gender, research findings are mixed. Multiple studies have shown that females participate less than male students [12]. For instance, [13] found that male students evaluate themselves as more active participants than female students. Studies have demonstrated a positive relationship between student participation in academic work and desirable outcomes. For example, participation is positively correlated with knowledge transfer, interaction with others, and creative problem-solving [14], and on the other hand, it contributes to academic progress [15].

In this article, we focus on gender identity and its impact on students' participation in art classes, considering the

prominent role of digital technology in the art education process. Understanding how male and female students respond to these technologies provides valuable insights. As the Abai Kazakh National Pedagogical University in Kazakhstan is a leading institution in training future teachers in the country, investigating gender differences in interaction with digital technology in art classes holds special significance. This research allows us to examine the role of gender in students' participation and engagement with digital technology in the field of art as a critical issue. Recognizing these differences can improve educational strategies and recommendations to ensure that all students participate equally in digital technology interaction without gender discrimination. This study can enhance the learning process and increase student participation in art classes. Additionally, it can assist educational administrators, art educators, and policymakers in developing strategies and programs that promote participation and learning for both genders, considering their needs and gender differences.

This research investigates gender differences in interaction with digital technology in the context of student participation in art classes. This study seeks to identify and analyze the extent of female and male students' participation in various aspects of digital technology use in art education. The research aims to illuminate how women may experience gender stereotypes more than men in art classes and how it influences their inclination to participate in competitive, collaborative, and evaluative activities. Ultimately, this study aims to contribute to a better understanding of the direct impact of gender on student participation in the realm of using digital technology in art education.

Therefore, this study pursues the following objectives:

- Examine the level of familiarity of female and male students with various digital technologies in art education.
- Investigate and analyze gender differences in student interaction with digital technology within the framework of art classes.
- Quantitatively examine and compare the level of participation of female and male students in various activities related to digital technology in art education.

Research has indicated that male scientific self-efficacy in STEM is higher than that of females [16]. In another study [17], a quantitative analysis of student participation revealed that women participated less than expected in 23 introductory biology courses. Despite a higher number of women in the classes, their voices accounted for only 40% of responses to instructors' questions. The study also demonstrated that men engage more through voluntary participation than women. Additionally, other studies have delved into participation differences among women in various fields [18, 19, 20].

In another study [21], investigations were conducted to assess student participation with instructional strategies in an active classroom. They observed that men engaged more than women in all types of interactions, exceeding expectations for gender composition in voluntary interactions and encouraging participation post-discussion. However, women identify with their gender more than men in the classroom and believe that their peers and instructors judge them based on gender. These findings suggest that women experience more gender stereotypes, leading to fear of conforming to stereotypes in competitive, participatory, and evaluative contexts, consequently impacting their participation.

II. TYPES OF STUDENT ENGAGEMENT

Student participation is one of the most crucial indicators of learning quality. In this regard, participation has been considered a significant factor in dropping out or aiding more tremendous success. As digital technologies continue to establish their presence in art education, offering a blended learning approach as an alternative to traditional teaching and learning methods, integrating digital technologies into the classroom and encouraging students to utilize them actively becomes essential.

Moreover, studies have demonstrated that teaching technology soundly can enhance student involvement [3].

In broad terms, student engagement involves actively participating in diverse academic and extracurricular activities and a dedication to attaining learning goals [22]. In other words, student engagement is when a student puts quality effort into learning and authentic engagement in academic activities.

Student engagement is the energy and effort that students invest in the classroom and during their learning process, assessable through various behavioral, cognitive, or emotional indicators in an observable chain. Engagement can be influenced by internal and external factors such as interactions with other students and instructors, learning methods, and the learning environment [23]. The more engaged and empowered students become in their learning community, the more likely they will channel energy into their learning. This leads to a spectrum of short-term and long-term outcomes, subsequently fostering increased participation [24].

The present-day scholarly literature concerning student engagement delineates three facets of the student engagement concept: behavioral, emotional, and cognitive engagement. [25, 26]. In general, student engagement is considered a multidimensional structure. Some researchers have divided this structure into three distinct dimensions: cognitive dimension (involving psychological investment in learning, self-regulated learning, and goal orientation), behavioral dimension (involving participation in school activities, classroom behavior, and initiative), and emotional dimension (involving feelings toward school and learning, interest, and school-related peer relationships) [27, 28, 29].

A. Behavioral engagement:

Behavioral engagement pertains to questions regarding student behavior in the classroom, student participation in school-related activities, and the student's interest in their academic tasks [30, 31]. [32] stated that behavioral engagement benefits when students actively participate in

learning activities and adhere to established norms, such as completing assignments on time. Behavioral engagement is defined by three major dimensions: learning and memorizing, positive peer interaction, and completion of class assignments.

Memorizing: The first dimension of behavioral engagement involves memorizing information and course content. Memorizing course content allows students to analyze and comprehend the material more deeply. This type of motivation directly appeals to students' curiosity and encourages them to understand better and engage with the course content. Through this active and responsible participation in their learning, students enhance their ability to retain and remember information.

Interaction: The second dimension of behavioral engagement involves students' participation in class-related activities, such as attending classes, having positive interactions with peers, and engaging in classroom activities [33]. Positive interactions with peers can strengthen the sense of connection and belonging to an academic community, fostering motivation for active class participation. These interactions can create a supportive and collaborative learning environment, promoting increased participation.

Class assignments: The third dimension of behavioral engagement is students' interest in their class assignments, referring to tangible behaviors demonstrating their willingness to participate in classroom activities and their determination to overcome challenging content [33]. These exercises provide an opportunity to reinforce the concepts and skills learned. Students are committed to analyzing and practically applying the course material by completing assignments, leading to deeper learning and increased participation.

B. Emotional engagement:

Pertains to students' emotional responses encompassing their interests, such as joy, enthusiasm, anxiety, and excitement. It has been determined that emotional engagement is associated with positive future orientations [34]. Additionally, it has been reported that emotional engagement is a significant factor in enjoying the learning process [35]. Emotional engagement focuses on the states related to students' emotional involvement during learning activities. Positive emotions include eagerness, interest, and pleasure during learning [36] and also encompass harmful emotional components such as boredom, discomfort, and frustration in the classroom. Emotional participation in learning activities emphasizes that emotional dynamics can either enhance or diminish learner interactions, directly impacting learning performance [37, 38]. In this article, emotional engagement is categorized into three indicators: voluntariness, feelings of enjoyment, and a sense of enthusiasm.

Voluntariness: Students' voluntariness to use technologies is the first sign of emotional engagement. The more learners engage courageously and curiously, the more it enhances their inclination and motivation. Voluntariness in art education is a bold initiative and plays a crucial role in artistic development and learning. This practice allows students to explore new aspects of art.

Enjoyment: The feeling of enjoyment follows in response to curiosity and voluntariness. Using digital technologies in art education can create an enjoyable and transformative experience for students. Students who engage in artistic activities using digital tools can directly and interactively involve themselves in the content and learning process. This enjoyable experience generates positive emotions such as wonder and joy and can foster feelings of success and enhance artistic skills.

Enthusiasm: These capabilities bring excitement and enthusiasm to art students, who can creatively and attractively create artistic works using these technologies. This sense of excitement and enthusiasm enables them to showcase their best creative results and approach the dynamic world of digital art with more motivation and energy, actively participating in it.

c. Cognitive engagement:

To accomplish tasks through a profound, self-regulated, and strategic learning approach instead of employing superficial learning strategies [39]. In this study, cognitive engagement is defined as the extent to which students are involved in responding to visual arts tasks. Cognitive engagement is operationalized with three indicators: autonomy, intrinsic motivation, and metacognition [40].

Autonomy is defined as a factor for internalizing information and processes and aligning them with the student's identity [41]. Independent students are those who decide about their learning interests. They choose what information to listen to or store.

Intrinsic motivation is recognized as a type of motivation for students, such as the desire to gain knowledge, personal progress, and sensory learning experience [42]. The internality of this motivation means that forces and motivations emerge internally and from within the individual, not due to external motivations or pressures.

Metacognition is the supervision of cognitive performance, meaning that students know their task-related knowledge and can complete it [43]. The purpose of metacognitive participation in arts education is to apply and complete this knowledge toward creating creative artistic ideas. Students need to be conscious of these goals and strive towards them. Those with heightened cognitive engagement exhibit interest in delving into and comprehending the assigned tasks and recognizing the purpose behind the learning activities [44].

III. METHODOLOGY

This study aimed to analyze gender disparities in digital technology interaction and examine the participation of students in art classes in the Department of Art Education and Graphic Design at Abai Kazakh National Pedagogical University. Initially, the level of familiarity of students with

various digital technologies used in the classroom was assessed. Then, through self-assessment by students, their level of participation was measured. The study employed a descriptive research method. Data were collected through three questionnaires. Initially, quantitative data were collected and then analyzed. The statistical population of this research included Master's students in the Art Education group at Abai Kazakh National Pedagogical University, comprising 40 students as respondents.

A. Research Participants:

Questionnaires were used to collect accurate data on the participation of art students in using digital technologies in art learning. Structured questionnaires were designed by experts based on previous research and primarily structured around three initial dimensions: behavioral engagement, emotional engagement, and cognitive engagement. This study matched the quantitative findings with three main variables: 1)behavioral engagement, 2) emotional engagement, and 3)cognitive engagement.

After content validity assessment, the number of valid questionnaire items was determined to be 22, with each sub-variable consisting of three questions.

The research ethics were approved by the head of the International Relations Department at Abai Kazakh National Pedagogical University, Dr. Karim Baigutov. The researcher explained the research purpose to all respondents. All responses are kept confidential and anonymous, with assigned codes and numbers. In addition, the researcher asked respondents to fill out a satisfaction form.

Initially, students were asked about various types of digital technology. Then, a list of types of digital technologies used in art classes was presented to them to answer questions related to these variables. It was determined that students had limited knowledge about some of these technologies, mainly technologies related to virtual reality, and their experiences with these technologies were mostly outside the university classroom. They were then asked to indicate their level of interest and participation (in behavioral, cognitive, and emotional domains) in using digital technologies. The data show that students' willingness to use technology in art classes was over 70% for female and male students in all three participation domains.

B. Results:

Based on the gathered information and data analysis, as shown in Table 1, male participants demonstrate a higher familiarity with various digital technologies. In contrast, female participants generally rated their familiarity lower in all cases. Only in the case of software and apps is there a relatively minor difference between male and female participants. Additionally, female participants are less familiar with 3D printing, Gamification, and Augmented Reality (AR) technologies. On the other hand, male participants show the lowest familiarity percentage with technologies like 3D printing, Artificial Intelligence, and Augmented Reality (AR). The highest level of familiarity among male participants is observed with laptops, tablets, and projectors, while female participants are more familiar with video conferencing technology.

TABLE 1
THE LEVEL OF STUDENTS' FAMILIARITY WITH DIFFERENT KINDS OF DIGITAL TECHNOLOGIES BY GENDER

Factor	Variable	Male	Female	Cronbach Alfa
Familiarity with different kinds of Digital technology	Laptop, tablet & projectors	88.4	78.7	0.96
	Video conferencing	85.0	79.1	
	Interactive whiteboards	80.6	74.5	
	3d printing	73.1	58.7	
	Gamification	75.9	58.7	
	Virtual reality (VR)	77.1	61.4	
	Augmented reality (AR)	74.3	59.3	
	Artificial intelligence (AI)	73.7	70.0	
	software and apps	76.8	75.0	
	Building digital content	85.0	69.1	

In Table 2, the data related to the level of students' engagement with digital technologies is presented. According to the statistics, male participants demonstrated higher emotional and behavioral engagement compared to their female counterparts. This is while the cognitive engagement of female students was estimated to be higher than male students. This implies that male students are more inclined to volunteer to use digital technologies, which evoke excitement and enthusiasm in them. On the other hand, female participants show a greater inclination to enhance their knowledge and skills and learn these technologies.

TABLE 2
THE LEVEL OF STUDENTS' ENGAGEMENT IN USING DIGITAL TECHNOLOGIES BY GENDER

Factor	Variable	Male	Female	Cronbach Alfa
Emotional engagement	I like to volunteer to use new digital technologies in art classrooms	86.8	83.1	0.91
	I am happy that I can use new technologies to learn and understand art subjects	83.1	78.5	
	I am always excited and eager to use digital technologies	90.9	88.3	
Behavioral engagement	I actively memorize and learn the steps of applying and using these technologies	85.9	82.5	

	I actively interact with other students, think and ask questions while using digital technologies	85.3	78.7	
	I actively practice the functions and features of digital technologies in the field of art	79.3	83.5	
Cognitive engagement	I focus and actively listen when using digital technologies in the art classroom	84.0	89.3	
	I am determined to master these technologies in the field of artistic creation	82.1	90.4	
	I am working hard to be able to use digital technologies more creatively	84.0	84.1	

Summarizing the information obtained regarding the level of student engagement, it is evident that male students having higher emotional engagement and female students exhibiting higher cognitive engagement.

TABLE 3
THE LEVEL OF STUDENTS' ENGAGEMENT IN USING DIGITAL TECHNOLOGIES

Variable	Male	Female	Total
Emotional engagement	86.9	83.3	85.1
Behavioral engagement	83.5	81.5	82.5
Cognitive engagement	83.3	88.2	85.6

TABLE 4
THE LEVEL OF STUDENTS' FAMILIARITY AND ENGAGEMENT WITH DIGITAL TECHNOLOGIES

Variable	Male	Female	Total
Familiarity with Digital technology	79.03	68.5	72.4
Engagement in using Digital technology	84.6	84.3	84.4

The results indicated that female students have less awareness and familiarity with various digital technologies in art classes, which leads to increased cognitive participation. However, in terms of overall participation, both groups are at a high level. They demonstrated a strong inclination to use these technologies in their classroom settings. Generally, the level of familiarity of the students remains lower than their participation level, reflecting their high motivation and enthusiasm for utilizing digital technologies.

IV. DISCUSSION

Based on the findings of this study, the level of women's participation in the use of digital technologies in art classes is perceived to be lower than their male counterparts in two areas of emotional and behavioral participation. Female participants stated they are less familiar with various digital technologies used in art classes. The need for more information and skill improvement can enhance cognitive participation among female participants, leading to a higher willingness to participate compared to their male peers. On the other hand, male participants claimed to have more information about digital technologies, resulting in increased self-confidence and assertiveness, which is reflected in their higher level of emotional participation, encompassing the dimensions of voluntariness, happiness, enjoyment, and eagerness. Overall, there is a slight difference in the average level of participation between female and male students. These results may provide new insights into participation with digital technologies in art education. In previous studies, the participation of female students was assessed as lower, as [21] stated that men participate more in all types of classroom interactions. Other researchers have also investigated and compared the level of participation between women and men in related areas [16, 20]. However, in this study, the average participation is generally assessed as equal, with the only difference being the level of familiarity and different dimensions of participation. Based on this, it can be stated that the level of familiarity with various digital technologies directly impacts emotional and cognitive participation.

V. CONCLUSION

Based on the collected information and results of data analysis, female students have less knowledge and familiarity with various digital technologies used in art classes. This lack of familiarity drives them to seek knowledge and information in this field, increasing their cognitive participation. On the contrary, male students are more familiar with digital technologies, resulting in lower cognitive participation and higher emotional participation than their female counterparts. Overall, the average participation of female and male students in using digital technologies is evaluated equally. Also, students' level of familiarity with new technologies directly affects their level of participation, and familiarity with technologies such as 3D printers and augmented or virtual reality is lower compared to other technologies. The highest level of familiarity is related to technologies such as laptops, tablets, projectors, and video conferencing. generally, male and female students' level of familiarity and knowledge in using digital technologies does not affect their level of engagement. In detail, it only affects the model of their participation.

VI. STATEMENTS AND DECLARATIONS

Funding Declaration: The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Competing Interest declaration: No competing interests declared. The authors have no relevant financial or non-financial interests to disclose.

Digital Object Identifier: (only for full papers, inserted by LACCEI).
ISSN, ISBN: (to be inserted by LACCEI).
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