How Digital Arts Participation Enhances Visual Literacy and Humanistic Development among Higher Vocational Students: A Mechanism-based Study

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Abstract

This study examined the relationships among digital arts participation, visual literacy, and humanistic development among higher vocational students. In the digital age, students are increasingly exposed to digital visual culture, and digital arts participation has become an important part of their learning and daily life. However, its influence on students' broader development has not been fully explored. Therefore, this study aimed to investigate whether digital arts participation could promote students' visual literacy and humanistic development, and whether visual literacy played a mediating role in this relationship. A quantitative research design was adopted in this study. Data were collected through a questionnaire survey from 278 students in higher vocational colleges in Hainan, China. The data collected were analyzed by using descriptive statistics, reliability analysis, correlation analysis, regression analysis, and mediation analysis. The results showed that digital arts participation had a significant positive effect on visual literacy and humanistic development. Visual literacy was also found to have a significant positive effect on humanistic development. In addition, visual literacy played a partial mediating role in the relationship between digital arts participation and humanistic development. These findings suggest that digital arts participation is not only helpful for students' visual competence, but also beneficial to their broader personal growth. This study provides empirical support for the educational value of digital arts participation in higher vocational education. It also suggests that colleges should pay more attention to the integration of digital arts activities, visual literacy cultivation, and humanistic education in the digital era.

Keywords

Digital arts participation, Visual literacy, Humanistic development, Higher vocational students, Mediation effect

Introduction

In recent years, digital technology has deeply changed the way students learn, communicate, and express themselves in higher education. In particular, the development of digital media, online visual platforms, image-editing tools, and artificial intelligence (AI)-supported creative applications has made digital arts participation more common in students' daily learning and personal life. In this context, digital arts participation is no longer limited to professional art training. It also includes a wide range of activities such as digital drawing, visual design, short video creation, online exhibition viewing, image-based storytelling, and interactive visual production. These forms of participation are becoming increasingly important in educational settings because they provide students with new opportunities to observe, interpret, and create visual content in meaningful ways. Research on digital creativity in higher education has shown growing academic interest in the educational value of digital creative practices and their connection with broader student competences [1].

At the same time, modern society is becoming more visual than ever before. Students are required not only to read written texts, but also to understand images, symbols, videos, interfaces, and other multimodal messages. Because of this change, visual literacy has become an essential competence in higher education. According to the Association of College and Research Libraries (ACRL) *Visual Literacy Competency Standards for Higher Education*, visual literacy includes the ability to find, interpret, evaluate, use, and create

images and visual media [2]. It also involves understanding the cultural, ethical, aesthetic, intellectual, and technical dimensions of visual materials. In other words, visual literacy is not simply a technical skill. It is a complex ability related to perception, judgment, communication, and critical thinking. Scholarships have also emphasized that visual literacy should be regarded as a central competence in twenty-first century higher education rather than a marginal or optional skill [3].

For students in higher vocational education, the issue is especially important. Higher vocational students are expected to develop practical abilities for future employment. They also need broader human capacities such as cultural understanding, ethical awareness, aesthetic sensitivity, empathy, reflective thinking, and the ability to communicate with others in increasingly visual and digital environments. In the Chinese educational context, these broader qualities are often discussed under the concept of "humanistic literacy".

However, in international academic writing, this idea may be more appropriately expressed as humanistic development, because it highlights students' overall growth in values, cultural understanding, self-reflection, and social awareness. From this perspective, humanistic development is not separate from vocational training. Rather, it is an important part of preparing students to become competent and thoughtful individuals in contemporary society. Research in art and design education has suggested that humanities-related knowledge, skills, and spirit can positively influence students' learning performance, which also supports the view that humanistic development deserves more attention in applied educational settings [4].

Arts education has long been regarded as a meaningful way to support students' personal growth. Recent studies have shown that participation in artistic or aesthetic activities can promote psychological well-being, emotional development, and positive learning experiences among university students [5]. Scholars have also increasingly used mediation models to explain how arts education influences student outcomes through variables such as emotional intelligence, psychological capital, or basic psychological needs [6]. These findings suggest that arts-related participation may work through specific internal mechanisms rather than producing outcomes directly. This line of thinking is useful for the present study because it encourages researchers to move beyond the simple question of whether digital arts participation is beneficial and instead ask how and why it may influence students' development.

Although existing studies have provided useful insights, several important gaps remain. First, many previous studies on arts education have focused on psychological well-being, creativity, or academic performance, while fewer studies have examined the relationship between digital arts participation and students' broader humanistic development. Second, research on visual literacy in higher education often emphasizes the need for visual competence, but less attention has been given to the role of digital arts participation as a possible antecedent of visual literacy. Some studies show that students still lack sufficient preparation in critical and visual reading in digital learning environments, which means that more research is needed on educational experiences that can improve these abilities. Third, although visual literacy is theoretically connected with interpretation, evaluation, reflection, and cultural understanding. There is still limited empirical research testing whether visual literacy can serve as a mechanism linking digital arts participation to broader developmental outcomes, especially among higher vocational students.

Therefore, this study aims to examine how digital arts participation enhances visual literacy and humanistic development among higher vocational students, with particular attention to the mechanism connecting these variables. More specifically, this study proposes that digital arts participation may positively influence students' visual literacy, and that improved visual literacy may further promote students' humanistic development. This mechanism-based perspective is meaningful for both theory and practice. Theoretically, it helps connect three research areas that are often discussed separately: digital arts education, visual literacy, and student humanistic development. Practically, it may offer useful suggestions for curriculum design in higher vocational education, especially in the context of digital transformation and aesthetic education reform.

Based on this background, the present study addresses the following questions:

(1) Does digital arts participation significantly predict

visual literacy among higher vocational students?

(2) Does visual literacy significantly predict students' humanistic development?

(3) Does visual literacy mediate the relationship between digital arts participation and humanistic development?

Literature review

This Digital arts participation has become more common in higher education because digital technology has changed the way students learn and express ideas. Students today often use digital tools to create images, videos, posters, and other visual works. They may also join online exhibitions, use design software, or share creative content on digital platforms. These activities are not only related to art learning, but also connected with communication, creativity, and self-expression. Therefore, digital arts participation has received increasing attention in recent educational research.

Visual literacy is an important ability in the digital age. It means that students can understand, interpret, evaluate, and create visual information. In modern education, students need to deal with many kinds of visual materials, such as pictures, videos, symbols, charts, and digital interfaces. Because of this, visual literacy is no longer only an art-related skill. It has become an important competence for learning, communication, and critical thinking. For higher vocational students, visual literacy is especially useful because many vocational fields require students to use visual information in study and future work [7].

At the same time, higher education should not only train students' technical skills but also support their broader personal development. In this study, this broader development is called humanistic development. It includes cultural awareness, aesthetic appreciation, reflective thinking, and understanding of human values. Although higher vocational education often pays more attention to practical skills and employment, humanistic development is also important. Students need not only professional ability, but also the capacity to understand society, respect others, and think more deeply about culture and life.

Previous studies have shown that arts education can positively influence students' emotional, cognitive, and social development [8,9]. Some research has found that participation in artistic activities can improve well-being, creativity, and communication skills [10]. Other studies suggest that visual learning experiences can help students better understand meaning, culture, and expression [11]. These findings indicate that arts-related activities may contribute to students' broader growth. However, many previous studies focus on general arts education, creativity, or mental health, while fewer studies examine digital arts participation in relation to visual literacy and humanistic development together.

In addition, visual literacy may play an important role in the relationship between digital arts participation and humanistic development. When students take part in digital arts activities, they have more chances to observe, analyze, and create visual content. This process may help them improve visual literacy. After that, stronger visual literacy may support students' understanding of culture, aesthetics, and human meaning, which can further promote humanistic development. In this way, visual literacy may work as a bridge between digital arts participation and humanistic development.

Based on the discussion above, this study proposes that digital arts participation may positively influence higher vocational students' visual literacy and humanistic development. It also assumes that visual literacy may mediate the relationship between the two. Therefore, the following hypotheses are proposed:

H_1: Digital arts participation is positively related to visual literacy among higher vocational students.

H_2: Visual literacy is positively related to humanistic development among higher vocational students.

H_3: Digital arts participation is positively related to humanistic development among higher vocational students.

H_4: Visual literacy mediates the relationship between digital arts participation and humanistic development.

Methodology

Research design

This study used a quantitative research design to examine the relationships among digital arts participation, visual literacy, and humanistic development among higher vocational students. A questionnaire survey was adopted as the main method of data collection because it is efficient and suitable for examining the relationships between variables in a large sample. Based on the previous literature and the research purpose, this study treated digital arts participation as the independent variable, visual literacy as the mediating variable, and

humanistic development as the dependent variable.

The study aimed to test four hypotheses. First, digital arts participation was expected to positively influence visual literacy. Second, visual literacy was expected to positively influence humanistic development. Third, digital arts participation was expected to positively influence humanistic development. Fourth, visual literacy was expected to mediate the relationship between digital arts participation and humanistic development.

Participants

The participants in this study were students from higher vocational colleges in Hainan, China. A convenience sampling method was used because it was practical and suitable for the actual research conditions. Students from different majors were invited to participate in the survey, including education-related majors, arts-related majors, management-related majors, and service-related majors. This helped increase the diversity of the sample.

A total of 320 questionnaires were distributed, and 296 were returned. After removing invalid responses, such as incomplete questionnaires and questionnaires with obvious repeated answers, 278 valid questionnaires were finally used for data analysis. The valid response rate was 86.9%.

Among the respondents, both male and female students were included. The participants also covered different grades, including first-year, second year, and third-year students. In this way, the sample could generally reflect the basic characteristics of higher vocational students in the selected colleges.

Instruments

The questionnaire used in this study consisted of four parts: demographic information, digital arts participation scale, visual literacy scale and humanistic development scale. All items were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Digital arts participation was measured by several items designed based on the research topic and related literature. This part mainly examined how often students participated in digital arts-related activities in their study and daily life. The items included activities such as making digital images, using design software, watching online art exhibitions, creating short visual works, and participating in digital creative tasks. Example items included: “I often participate in digital visual creation activities” and “I use digital tools to express my ideas or feelings”. A higher score indicated a higher level of digital arts participation.

Visual literacy was measured by items focusing on students’ ability to understand, interpret, evaluate, and create visual information. This part reflected students’ competence in dealing with images, videos, symbols, and other visual materials. Example items included: “I can understand the meaning of visual information clearly”, “I can judge whether visual content is effective” and “I can use visual forms to express my ideas”. A higher score indicated a higher level of visual literacy.

Humanistic development was measured by items related to cultural understanding, aesthetic appreciation, reflective thinking, and sensitivity to human values. This part aims to reflect students’ broader personal development beyond technical learning. Example items included: “I pay attention to the cultural meaning behind artistic works”, “I am willing to reflect on life and society through artistic experience” and “Art-related experiences help me better understand people and society”. A higher score indicated a higher level of humanistic development.

Data collection

The data was collected over a period of four weeks. Before the formal survey, a small pilot test was conducted with 20 students to check whether the questionnaire items were clear and easy to understand. Based on their feedback, several expressions were revised to improve clarity and readability.

After that, the formal questionnaire was distributed both online and offline. The purpose of the study was explained to the participants before they completed the questionnaire. Participation was voluntary, and students were informed that their responses would be used only for academic research. They were also told that the survey was anonymous and that their personal information would be kept confidential.

Data analysis

The data collected were analyzed using SPSS. First, descriptive statistics were used to describe the basic characteristics of the participants, including gender, grade, and major. Means and standard deviations were also calculated for the main variables.

Second, reliability analysis was conducted to test the internal consistency of the three scales. Cronbach’s alpha

values were used to examine whether the items in each scale had acceptable reliability. In general, a Cronbach's alpha value above 0.70 was considered acceptable.

Third, correlation analysis was used to examine the relationships among digital arts participation, visual literacy, and humanistic development. If the correlation coefficients were positive and significant, the basic relationships among the variables could be supported.

Finally, regression analysis was used to test the hypotheses. In addition, mediation analysis was conducted to examine whether visual literacy played a mediating role in the relationship between digital arts participation and humanistic development. If digital arts participation significantly predicted visual literacy, and visual literacy significantly predicted humanistic development, while the indirect effect was significant, the mediating effect could be supported.

Results

A total of 278 valid questionnaires were included in the final analysis. Among the respondents, 116 were male students (41.7%) and 162 were female students (58.3%). In terms of grade, 98 students (35.3%) were first-year students, 104 students (37.4%) were second-year students, and 76 students (27.3%) were third-year students.

Table 1 presents the descriptive statistics, reliability, and correlation results of the main variables. The mean score of digital arts participation was 3.42, standard deviation (SD) =0.68, showing that the students had a moderate level of participation in digital arts activities. The mean score of visual literacy was 3.57 (SD=0.61), and the mean score of humanistic development was 3.63 (SD=0.59). These results suggest that the respondents generally showed moderate to relatively positive levels on the three variables.

In terms of reliability, the Cronbach's alpha values for digital arts participation, visual literacy, and humanistic development were 0.84, 0.87, and 0.85, respectively. All values were above 0.80, indicating good internal consistency of the scales.

The correlation analysis showed that digital arts participation was positively correlated with visual literacy ($r=0.51$, $p<0.01$) and humanistic development ($r=0.43$, $p<0.01$). Visual literacy was also positively correlated with humanistic development ($r = 0.58$, $p<0.01$). These findings provided preliminary support for the proposed hypotheses.

Table 1. Descriptive statistics, reliability, and correlations among the main variables.

Variable	Mean	SD	Cronbach's alpha	Digital arts participation	Visual literacy	Humanistic development
Digital arts participation	3.42	0.68	0.84	1	/	/
Visual literacy	3.57	0.61	0.87	0.51**	1	/
Humanistic development	3.63	0.59	0.85	0.43**	0.58**	1

Note: **p<0.01.

To further test the hypotheses, regression analysis was conducted. First, digital arts participation significantly predicted visual literacy ($\beta = 0.51$, $p < 0.001$), which supported H_1. This means that students who participated more in digital arts activities were more likely to have stronger visual literacy.

Second, visual literacy significantly predicted humanistic development ($\beta=0.52$, $p<0.001$), supporting H_2. This result suggests that students with a higher level of visual literacy were also more likely to show a higher level of humanistic development.

Third, digital arts participation significantly predicted humanistic development ($\beta = 0.43$, $p < 0.001$), which supported H_3. In other words, digital arts participation had a direct positive effect on students' humanistic development.

Finally, mediation analysis was conducted to test H_4. The results showed that after visual literacy was added into the model, the effect of digital arts participation on humanistic development decreased from $\beta = 0.43$ to $\beta=0.21$, but it still remained significant ($p<0.01$). At the same time, visual literacy remained a significant predictor of humanistic development ($\beta=0.43$, $p<0.001$). This indicates that visual literacy played a partial mediating role in the relationship between digital arts participation and humanistic development. Therefore, H_4 was supported.

Overall, the results suggest that digital arts participation can positively promote both visual literacy and humanistic development among higher vocational

students. In addition, visual literacy partly explains how digital arts participation contributes to humanistic development.

Discussion

The purpose of this study was to examine the relationship among digital arts participation, visual literacy, and humanistic development among higher vocational students. The results showed that digital arts participation had a significant positive effect on visual literacy and humanistic development. In addition, visual literacy also had a significant positive effect on humanistic development and played a partial mediating role in the relationship between digital arts participation and humanistic development. These findings generally support the proposed hypotheses and suggest that digital arts participation can play an important role in students' broader development.

First, the study found that digital arts participation significantly predicted visual literacy. This result means that students who more often took part in digital arts activities were more likely to have better abilities in understanding, interpreting, and expressing visual information. This finding is reasonable because digital arts participation gives students more chances to contact visual materials and use visual forms to communicate ideas. In the process of creating digital images, videos, or designs, students need to pay attention to color, composition, meaning, and audience. These experiences may gradually improve their visual awareness and visual expression ability. Therefore, digital arts participation can be understood as an effective way to support the development of visual literacy in higher vocational education.

Second, visual literacy was found to have a significant positive effect on humanistic development. This suggests that visual literacy is not only a technical skill, but also related to students' broader personal growth. Students with higher visual literacy may be better able to understand cultural meaning, aesthetic value, and human emotions expressed through visual materials. They may also be more sensitive to the relationship between images, society, and human life. As a result, stronger visual literacy may help students develop more reflective thinking, aesthetic appreciation, and cultural understanding. This finding shows that visual literacy has a broader educational value and should receive more attention in vocational education.

Third, digital arts participation also had a direct positive effect on humanistic development. This means that when students participate more in digital arts activities, they may become more open to artistic experience, cultural content, and personal reflection. Digital arts activities can offer students opportunities for self-expression and emotional communication. They may also encourage students to think about beauty, values, meaning, and social experience. For this reason, digital arts participation may help students go beyond purely skill-based learning and support their humanistic growth. This finding is important because higher vocational education is often seen as focusing mainly on practical ability and employment. The present study suggests that digital arts participation can also contribute to the broader developmental goals of vocational education.

Another important finding of this study is that visual literacy played a partial mediating role between digital arts participation and humanistic development. This means that digital arts participation does not influence humanistic development only in a direct way. It also works indirectly by improving students' visual literacy. In other words, when students participate in digital arts, they first improve their ability to understand and create visual meaning, and this ability then helps them develop stronger humanistic awareness. This result helps explain the mechanism behind the effect of digital arts participation. It also supports the idea that visual literacy can function as an important bridge between artistic practice and broader human development.

The findings of this study also have some practical implications. First, higher vocational colleges should pay more attention to digital arts participation in both formal courses and extracurricular activities. Schools can provide students with more opportunities to join digital design, visual creation, online exhibition, and multimedia expression activities. Second, visual literacy should be included as an important educational goal in vocational teaching. Teachers can encourage students to not only use visual materials, but also analyze and evaluate them critically. Third, vocational education should attach importance to students' humanistic development rather than focusing only on professional skills. Digital arts education may provide a useful path to combine practical learning with aesthetic and humanistic

growth. Fourth, digital technology can be used to facilitate the implementation of digital art education. For example, drawing on the design ideas of the university students' employment and mental health support system built using BP neural networks. Drawing on these ideas, an intelligent support platform for the comprehensive development of vocational college students that integrates digital art participation and visual literacy training can be established. At the same time, combined with the methods for evaluating and improving deep learning capabilities in blended learning, the teaching model of digital art courses can be optimized [12,13].

However, this study also has some limitations. First, the sample was collected from higher vocational colleges in Hainan, so the findings may not be fully generalized to students in other regions. Second, this study used self-reported questionnaire data, which may be influenced by students' subjective judgment. Third, the study used a cross-sectional design, so it cannot fully explain long-term causal relationships among the variables. Future studies may use larger samples, different regions, and longitudinal methods to further test the research model. Researchers may also examine other possible mediating or moderating variables, such as aesthetic experience, digital literacy, or learning motivation.

Overall, this study suggests that digital arts participation is meaningful for higher vocational students' development. It can improve students' visual literacy and also promote their humanistic development directly and indirectly. Therefore, digital arts participation should be given greater importance in higher vocational education in the digital age.

Conclusions

This study examines the relationships among digital arts participation, visual literacy, and humanistic development among higher vocational students. The results show that digital arts participation has a significant positive effect on both visual literacy and humanistic development. Visual literacy also has a significant positive effect on humanistic development and plays a partial mediating role in the relationship between digital arts participation and humanistic development.

These findings suggest that digital arts participation is not only related to students' creative or technical experience, but also connected with their broader personal growth. By taking part in digital arts activities, students may improve their ability to understand and express visual meaning, and this improvement may further support their cultural awareness, aesthetic appreciation, and reflective thinking. Therefore, digital arts participation can be seen as a meaningful educational path in higher vocational education.

This study also highlights the importance of visual literacy in the digital age. For higher vocational students, visual literacy is not only useful for learning and future work, but also helpful for their humanistic development. In this sense, vocational education should pay more attention to the integration of digital arts learning, visual literacy cultivation, and humanistic education.

Although this study has some limitations in sample scope and research design, it still provides useful evidence for understanding the educational value of digital arts participation. Future research can further test this model in different regions and with more diverse samples. In general, this study shows that digital arts participation has positive value for promoting both visual literacy and humanistic development among higher vocational students.

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Conflict of Interest

The authors declare no conflict of interest.

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