Exploring the Influence of Xiaohongshu Application on Student Academic Performance and Technology Acceptance in Design Sketch Course: A Case Study at Sichuan Vocational College of Arts

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Abstract

Background and Aim: This study aims to explore the application of the Xiaohongshu mobile application in creating electronic portfolios, as well as editing, storing, and displaying students' electronic works in design sketch classes. The use of electronic portfolios can encourage students to constantly reflect on their artistic creations and improve their level of artistic performance. The objective of this research is to utilize the Xiaohongshu software as a platform for teaching technology and investigate the integration of electronic portfolios into design sketch classes, to enhance students' performance in design sketch works.

Materials and Methods: The research utilized pre-tests and post-tests are conducted to evaluate students' performance in four areas of their design sketches: composition, space, details of objects and environment, and line quality. The questionnaire was used to measure students' PU and PEOU during the process of creating an electronic portfolio using Xiaohongshu software. Data were collected through test scoring and questionnaires, and statistical analysis and path hypothesis tests were conducted by Jamovi software.

Results: The integration of the Xiaohongshu application software into the design sketch course exhibited positive outcomes. Analysis of pre-and post-test data revealed significant improvements in students' design sketch proficiency across various dimensions: composition, space representation, detailing of objects and environments, and line quality. Questionnaire survey results demonstrated favorable perceptions among students regarding the perceived usefulness and ease of utilizing the app for electronic portfolio creation. The study's findings suggest that the app contributes effectively to enhancing students' artistic capabilities.

Conclusion: This study introduced the Xiaohongshu application software as an innovative e-learning tool for documenting painting processes and fostering curriculum exchange. Through a quasi-experimental approach, it assessed the software's impact on students' design sketch proficiency by creating electronic portfolios. The study also surveyed students' perceptions of its usefulness and ease of use. Findings demonstrated that integrating Xiaohongshu positively affected students' design skills, particularly in composition, spatial representation, detailing, and line quality. Students' positive feedback further validated the software's effectiveness. Additionally, the study highlighted the emergence of live online courses as a potential teaching mode. Future research could expand its scope by investigating diverse painting techniques and longer timeframes. In essence, this study underscores technology's transformative potential in traditional artistic education, paving the way for innovative pedagogical approaches and enhancing students' artistic growth.

Keywords: Classroom Interaction; Electronic Portfolios; Xiaohongshu; Student Academic Performance; TAM

Introduction

With the advancement of Internet technology, there has been an increasing integration of education and teaching technology in higher education in China. In the context of fine art painting instruction, it is imperative to consider how to effectively incorporate technology to enhance traditional teaching methods. Information and communication technologies are redefining the arts, compelling visual arts educators to explore novel pedagogy mediated by technology, devise innovative teaching strategies and methods, and establish technology platforms that engage students with new media (Hanh, & Huong, 2021).

The application of information technology in art education has introduced a novel approach to sketch teaching. The experts have developed a virtual reality sketch learning system, based on CorelDraw, which has been compared with the traditional teaching method. The evaluation of teaching

effectiveness and data analysis demonstrates that virtual reality technology is in line with traditional teaching methods in enhancing students' sketching skills, including spatial shaping, compositional modeling, and coordination of light and shadow (Wang & Zhang, 2015). In the courses of design sketching, color theory, and technical practices, the utilization of instructional technology is relatively limited.

The design sketch, serving as a fundamental course for art and design majors, plays a pivotal role in the foundational education of freshmen. Teaching design sketches is one of the most crucial components in the basic curriculum of art and design studies. It serves as a commonly employed expressive language by designers during creation, forming the bedrock of artistic design. Currently, design sketch courses are offered by most colleges and universities with slight variations in credit allocation and class duration. The credit hours for these courses typically range from 3 to 6, with a duration of 54 to 128 class hours. The current practice in traditional art classrooms involves instructors employing design sketch textbooks, multimedia resources (such as images or videos), and PowerPoint presentations to effectively impart essential knowledge and conceptual understanding of design sketches. Lessons are conducted in a structured manner according to a predetermined plan, with students actively listening and engaging in practical exercises. The conventional approach of manual illustration remains the fundamental training method for design sketch, which is continuously employed in the process of practice. However, students seldom exhibit commendable performance in the design sketch class. The design sketch proficiency of certain students has not shown significant improvement, despite their utilization of the resources and tools provided by their instructor. The level of student engagement in the classroom is relatively low, and there is a lack of communication among students, teachers, and peers. In the instructional process of design sketching, the researcher contemplates integrating technology to enhance traditional teaching methodologies.

The researcher carefully selected the most widely used mobile application among young individuals to integrate into the design sketch class. This integration allows students to effectively share and document their learning experiences and composition summaries using a blend of music, text, and video notes. This innovative approach covers a spectrum of elements including composition, spatial comprehension, object detailing, environmental factors, and line quality within the realm of design sketching. The primary goal of this initiative is to drive the advancement of new media network education in colleges and universities. This is achieved by harnessing the unique knowledge-sharing capabilities provided by the Xiaohongshu community platform.

Objectives of the Research
1. To investigate the impact of utilizing the Xiaohongshu application for creating electronic portfolios on students' academic performance in designing sketch works.
2. To assess students' attitudes towards the perceived usefulness and perceived ease of use of the Xiaohongshu application in the context of the design sketch course.

Literature Review
Xiaohongshu
The community-driven e-commerce platform Xiaohongshu was established in June 2013. During its initial phase, it predominantly consisted of two main sections: a user-generated content model-driven overseas shopping sharing community and a "Welfare Society" dedicated to cross-border e-commerce. In the year 2014, Xiaohongshu introduced a community function that facilitated users to share and engage with original content, forming a distinct User Generated Content (UGC) model (Zhong, 2021). This UGC approach has become the central avenue for disseminating information on the Xiaohongshu platform. In essence, UGC empowers users to share their text, images, videos, and audio in diverse formats across the internet, aligning with the communicative style of new media (Ru, 2020). With a user base exceeding 300 million, Xiaohongshu sees the exchange of billions of posts daily (Miao, 2020). As the field of education evolves in tandem with the contemporary zeitgeist, it is embracing the trend of enriched network-sharing resources, which, in turn, transforms students' modes of learning. The Xiaohongshu mobile application, functioning as a high-quality we-media platform for knowledge

sharing, houses a wealth of learning resources. Serving as a conduit for interactive sharing, Xiaohongshu emerges as a prime avenue for disseminating knowledge. Through short videos, images, and text, users can share facets of their lives, personal interests, products, academic insights, and professional expertise across a diverse range of fields (Liu & Gao, 2022).

Constructivism Theory

The constructivist learning theory not only centers on the comprehension and interpretation of knowledge acquisition but also places a paramount emphasis on the influence of the learning environment. Thus, it underscores the critical significance of crafting an optimal learning milieu. The theory postulates that learning is a dynamic process in which learners autonomously build internal mental representations by interacting with their surrounding environment. Within this framework, they partake in activities that foster the creation of meaning through interpersonal collaboration, communication, and discourse with others within specific contexts (Xia Gao, 2008).

Over time, the constructivist learning theory has undergone significant evolution, propelled by the contributions of pivotal theorists. In the 1920s, Jean Piaget introduced cognitive constructivism, underlining that children actively forge knowledge through cognitive developmental stages (Piaget, 1973). In the 1930s, Lev Vygotsky proposed social constructivism, accentuating the role of social interactions and cultural contexts in shaping cognitive growth. He introduced the concept of the Zone of Proximal Development (ZPD), emphasizing learning through collaborative engagement with more knowledgeable individuals (Vygotsky & Cole, 1978). During the 1960s, Jerome Bruner (Bruner, J. (1961) contributed to constructivism by highlighting active learning, wherein learners organize information into meaningful mental constructs with the aid of scaffolding (Bruner, 1961). In the 1980s, Papert and Harel (1990) expanded constructivism through constructionism, advocating for learning via the creation of tangible artifacts or projects. Contemporary advancements amalgamate insights from cognitive science, neuroscience, and technology-enhanced learning to further enhance the learner-centered approach. These collective developments within the constructivist framework have revolutionized educational practices and enriched our comprehension of how learners actively partake in the process of knowledge construction.

Social Learning Theory

Social Learning Theory, proposed by Canadian psychologist Albert Bandura in the 1960s, is a framework that explores how individuals acquire behaviors through continuous interaction with their specific social environments. Drawing influence from learning theorists like Miller and Dollard, Bandura applied learning principles to social behavior. He posited that human learning is a process of reciprocal interaction between personal factors, environmental influences, and cognitive perceptions within social contexts, ultimately shaping acquired behaviors (Bandura & Walters, 1977).

The significance of Bandura's Social Learning Theory extends across various practical domains. In education, educators can leverage this theory by utilizing concepts of observational learning and feedback mechanisms in the classroom to facilitate student learning (Weinstein & Mayer, 1986). In the workplace, leaders can enhance employee performance by fostering positive self-efficacy and utilizing social media platforms to share information and skills (Locke & Latham, 1990). Over time, Social Learning Theory has evolved under the guidance of scholars like Robert Sears and Albert Bandura. Initially aimed at applying the language and principles of learning theory to comprehend intricate human functioning, it has matured into a sophisticated framework that incorporates contemporary information-processing concepts (Grusec, 1994).

Albert Bandura's Social Learning Theory illuminates the dynamic interplay between individuals, their cognitive processes, and their social environments in the acquisition of behaviors. Its applications span diverse fields, from education to the workplace, making it a cornerstone in understanding and influencing human behavior.

Classroom Interaction

The term "classroom interaction" pertains to the dynamic exchange that occurs within the classroom setting, encompassing interactions between the teacher and learners, as well as among the learners themselves (Nunan & Carter, 2001). In the past, classrooms predominantly adhered to a teacher-led model where students assumed passive roles, receiving information primarily through

lectures (Rosenshine, 1997). However, as educational theories evolved, a greater emphasis emerged on fostering student engagement and active participation. This shift paved the way for the rise of student-centered approaches to classroom interaction.

John Dewey championed experiential learning, advocating for robust student involvement and a hands-on approach to learning material (Brown, 2008). Lev Vygotsky posited that learning is facilitated through social interactions with peers, teachers, and the environment. This perspective underscores the significance of collaborative learning and the co-construction of knowledge through the exchange of ideas among students, thereby promoting deeper comprehension (Vygotsky & Cole, 2018).

The advent of educational technology has propelled classroom interaction into a new phase of evolution. The integration of computers, multimedia, and communication tools has ushered in fresh possibilities for interaction within the classroom environment. This integration enables students and teachers to engage in online discussions, collaborative projects, and virtual learning experiences that transcend traditional confines, fostering global connectivity (Kaasila et al., 2010). As a result, physical barriers are dismantled, and the learning environment extends beyond the conventional classroom boundaries.

Electronic Portfolio

Abrami and Barrett (2005) provide a comprehensive definition of an electronic portfolio as a digital repository capable of containing diverse media forms, including text, images, video, and sound. The advantages of employing electronic portfolios in the realm of learning encompass rapid accessibility, effortless storage, and the enhancement of multimedia technological skills. In the context of higher education, electronic portfolios are regarded as fundamental tools for ensuring quality. Over the past few decades, there has been a growing emphasis on the exploration of electronic archives within the spheres of undergraduate and graduate higher education (Wuetheric & Dickinson, 2015). These archives, considered analogous to Xiaohongshu, serve as essential components of quality assurance. Their role extends to monitoring and cultivating activities that aid students in constructing knowledge, enriching academic endeavors, and refining the efficacy of learning and teaching processes (Akleh & Wahab, 2020).

The integration of technology and academic curriculum work is a defining characteristic of electronic portfolios, progressively becoming an integral facet of higher education curricula. These portfolios empower students to showcase their academic achievements on digital platforms, offering a novel perspective (Zinger & Sinclair, 2014). In the context of the design sketch class, the researcher harnessed Xiaohongshu to forge students' electronic portfolios. This involved storing and exhibiting students' electronic works and utilizing the platform as a conduit for sharing electronic learning materials and curricular exchange. Through this approach, students' processes of learning and creative expression in drawing were documented.

In summation, the electronic portfolio, as realized through platforms like Xiaohongshu, embodies the synergy between technology and education, facilitating enriched learning experiences and providing valuable tools for academic progress.

The Formal Elements Art Therapy Scale (FEATS)

The Formal Elements Art Therapy Scale (FEATS) stands as a quantitative measurement framework that assigns numerical values to overarching characteristics within two-dimensional art, specifically within the domains of drawing and painting (Linda M & Bruceton, 2009). This system quantifies global attributes present in both "free-form" artistic creations and those generated in response to specific directives. With its emphasis on structural aspects rather than content, FEATS offers a straightforward method for comparing artworks from various groups, irrespective of factors such as ethnicity, age, treatment history, education, or gender. The FEATS framework is particularly adept at evaluating drawings and encompasses 14 distinct subscales: Prominence of Color, Color Harmony, Implied Energy, Spatial Arrangement, Integration, Logical Structure, Realism, Problem-Solving, Developmental Progression, Object and Environmental Details, Line Quality, Depiction of Human Figures, Rotation, and Repetition (Linda M & Bruceton, 2009). The specific variables chosen by the researchers were evaluated within the context of this study using the FEATS system.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), formulated by Davis, delves into the cognitive processes that underlie individuals' perceptions and embrace of new technologies (Silva et al., 2015). Grounded in the principles of Diffusion of Innovations and the Theory of Reasoned Action, the original TAM model (Davis, 1989) comprises two core constructs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). These factors wield a direct influence on users' behaviors regarding technology acceptance. As TAM's application and research have progressed, scholars have begun to acknowledge the potential existence of supplementary influential components within the model. In extending TAM, some researchers have introduced additional variables like Subjective Norms and Perceived Behavioral Control to enhance the model's explanatory capacity concerning users' technology adoption behaviors (Venkatesh & Davis, 1996). Certain scholars have harnessed Structural Equation Modeling (SEM) to scrutinize the relationship between TAM factors and to uncover the role of other influencing variables (Collier, 2020). Addressing evolving research demands, some academics have introduced the Extended Technology Acceptance Model (ETAM) (Abdullah & Ward, 2016).

Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), the cornerstones of TAM, offer crucial insights into comprehending students' attitudes toward the flipped classroom model, its implications for academic performance, and overall satisfaction. Therefore, the researcher will employ these constructs as variables for investigation.

Conceptual Framework and Research Hypothesis

Conceptual Framework

Before experimenting, the researcher evaluated the instructional class's artistic performance, with a specific focus on four variables derived from FEATS: composition, space, details of objects and environment, and line quality. Subsequently, an experimental phase was initiated, entailing the creation of electronic portfolios through the utilization of the Xiaohongshu application. A post-test assessment was administered to the same instructional class as part of this experimental phase. Concurrently, a survey in the form of a questionnaire was deployed to assess participants' perceptions regarding the perceived usefulness and perceived ease of use of the Xiaohongshu software (See Figure 1).
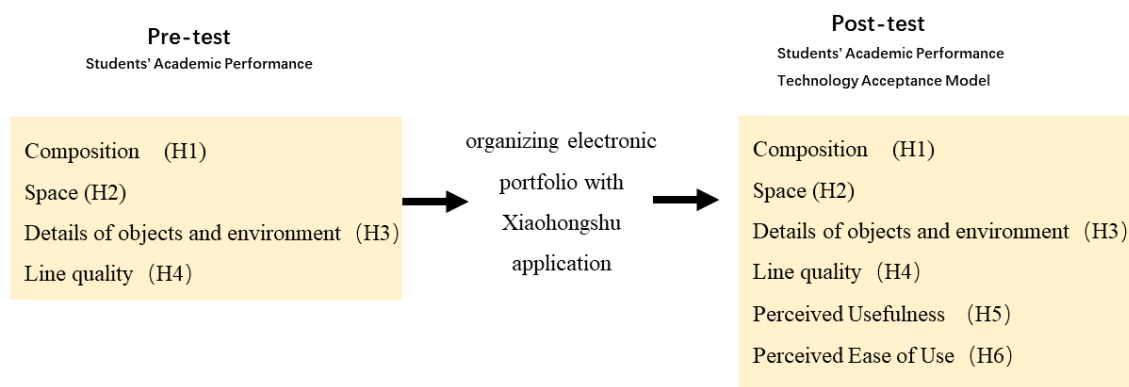
Figure 1: The Conceptual Framework of the Study

Composition

The term "composition" originates from Latin and initially conveys the notions of structure, connection, arrangement, and the interrelation of each component in an image, eventually culminating in a harmonious unified picture. Broadly, it refers to the representation or symbolic depiction of spatial occupancy (Betti & Sale, 1980; Monahan, Seligman & Clouse, 2004). In a more specific context, composition refers to an artist's deliberate organization and integration of visual elements within a defined space to communicate distinct ideas, artistic concepts, and emotions. This is achieved while adhering to aesthetic principles governing the relational positions of image symbols and while effectively conveying ideological content. In the realm of design sketching, composition assumes a

paramount role. It plays an instrumental part in orchestrating the arrangement and integration of visual elements, enabling artists to effectively convey their intended narratives, emotions, and concepts. As such, composition becomes the cornerstone upon which a captivating and coherent artistic statement is constructed.

Space

Space, characterized by its dimensions of length, width, and height, holds a three-dimensional essence. In the realm of art, practitioners harness diverse techniques like line, ink, light, shade, color, perspective, and composition to conjure three-dimensional or even multidimensional spatial illusions on two-dimensional surfaces. This artistic prowess imparts the potential for images encapsulated within frames or scrolls to construct a relatively autonomous spatial realm. Nonetheless, within the realm of painting, space assumes a constructed two-dimensional form, an artful fabrication that thrives as a visual mirage, rather than a tangible reality. This orchestrated spatial simulation serves to illustrate the relational dynamics between individuals and their surroundings, the objects encompassed within that environment, and the objects themselves (Liu, 2010).

The spatial dimension in design sketches stands as a pivotal facet that necessitates meticulous consideration within the realm of painting. By deftly manipulating spatial elements, artists not only evoke depth and dimension within their creations but also conjure immersive realms that resonate with viewers. This orchestrated spatial realm, while grounded in illusion, remains a potent tool for conveying intricate relationships, emotions, and narratives within artistic compositions.

Details of objects and environments

In the realm of traditional painting, the intricate details meticulously portrayed within the artwork serve as a testament to the artist's keen observation of objective subjects, unveiling their innate uniqueness (Han, 2020). Detail assumes a pivotal role as an essential cornerstone of a comprehensive artwork, with each element contributing indispensably to the whole. Beyond merely enhancing the aesthetics, these details shape the artistic expression and allure of a composition, infusing even the tiniest fragment with profound significance (Han, 2020). Within the intricate fabric of painting, details encompass nuanced intricacies and vital elements that collectively constitute the essence of artistic craftsmanship. They go beyond ornamental embellishments, serving as the building blocks of the visual narrative, laden with symbolic meanings, emotions, and contextual cues. These minutiae stand as potent identifiers of an artist's work, encapsulating the smallest aesthetic units within the broader creative endeavor. Ultimately, the concept of detail in painting encapsulates the artist's dedication to capturing the essence of their subject matter, imbuing it with layers of meaning, and crafting a captivating and thought-provoking visual experience.

Line quality

In the realm of painting, the concept of line involves an artist's perceptive observation and intentional use of diverse media to encapsulate real-world objects within a condensed abstract form. This artistic endeavor is geared towards conveying expressive symbolism, inviting the audience to appreciate and interpret the artwork. The realm of lines encompasses a spectrum of variations in priority, width, length, and thickness, encompassing straight lines, graceful curves, bold strokes, delicate strokes, and more (Zhang, 2021). Lines emerge as ever-present components within every artwork, serving as foundational elements that underpin the visual composition. Consequently, lines could be perceived as the fundamental language of painting, a versatile tool that artists adeptly wield to communicate their visions (Fan, 2017). The strategic utilization of different line forms becomes pivotal in effectively conveying the intended imagery. The expression of lines serves as a vital medium for crafting visual models within paintings. Lines embody fundamental forms that actively facilitate this creative process. Each line within an artwork assumes a distinct purpose: to illuminate the roles played by diverse elements within the composition.

Hypothesis

Ha1: The use of the Xiaohongshu application software for electronic portfolios contributes to enhancing students' composition proficiency.

Ha2: The use of the Xiaohongshu application software for electronic portfolios improves students' ability to represent space.

Ha3: The use of the Xiaohongshu application software for electronic portfolios enhances students' proficiency in representing details of objects and environments.

Ha4: The use of the Xiaohongshu application software for electronic portfolios improves students' line quality ability.

Methodology

The primary objective of this study is to assess the impact of employing the Xiaohongshu application software on students' design sketch works within the context of the design sketch class, particularly in the creation of electronic portfolios. The research methodology employed is rooted in a quantitative approach. Throughout the design sketch process, the Xiaohongshu application software is leveraged for the construction of electronic portfolios. To gauge the effects, both pre-tests and post-tests are conducted to evaluate students' performance across four distinct aspects of their design sketches: composition, spatial arrangement, details of objects and environment, and line quality. In parallel, a questionnaire is employed to measure students' perceptions of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) during their engagement with the Xiaohongshu software while crafting electronic portfolios. This comprehensive approach seeks to quantitatively elucidate the influence of the Xiaohongshu application on students' design sketch capabilities and their perceptions of utility and usability.

Population and Sample Size

The study's target population comprises freshmen enrolled at Sichuan Vocational College of Arts in Chengdu, China. The Design Sketch course stands as a pivotal foundational offering mandatory for all first-year students within the Department of Design, constituting an integral component for academic credit attainment. It's noteworthy that all participating students possess a foundational background in painting, having undergone art college entrance examination preparations that encompass still life painting. Before university enrollment, students have cultivated a certain level of comprehension in painting theory, equipped with a foundational grasp of basic painting concepts and knowledge, as well as proficiency in sketching.

The instructional trajectory within the design sketch class entails progressing from still-life depictions, starting with the portrayal of still-life objects, subsequently leading to the assessment of students' design sketch works following pedagogical intervention strategies. The research is implemented within the teaching classes of the researcher, specifically comprising Interior Design Class 1 and Class 2 within the Department of Art Design, totaling 63 students. It's worth noting that due to personal reasons, three students from Class 2 did not attend school during the experiment's duration. As a result, the study's sample size comprised 60 participants.

Sampling Method

The study focuses on freshmen enrolled in the art design department of Sichuan Art Vocational College, located in Sichuan Province, China. Each major has a varying number of applicants and enrolments, typically with 30 students assigned to each class. Different teaching classes are led by different instructors. The researcher is a teacher from the Art Design Department of Sichuan Vocational College of Arts in Chengdu, Sichuan Province, China. Therefore, in the experimental study, the overall sample is selected using purposeful sampling, and two classes taught by the researcher are selected as research samples (Miles & Huberman, 1994). The researcher's teaching class was deliberately selected as the experimental object. Comparative analysis was conducted before and after the experiment.

Research Instrument

The measurement of variables in this study is divided into two main components:

Firstly, the assessment of students' sketching works was conducted both before and after the experiment. The evaluation encompasses four key variables: composition, space, details of objects and environments, and line quality. Each of these variables is scored out of 25 points, contributing to a total score of 100. The scoring scale for each variable is further divided into five-point intervals: 1-5, 6-10, 11-15, 16-20, and 21-25. The assessment adheres to the design sketch scoring standards established by Sichuan Art Vocational College.

Secondly, students' perceptions of the usefulness and ease of use of the Xiaohongshu APP

were gathered through a questionnaire survey. This survey employed a Likert scale ranging from 1 to 5, where the interpretations are as follows: 1-1.8: Strongly Disagree, 1.81-2.61: Disagree, 2.62-3.42: Neutral, 3.43-4.23: Agree, 4.24-5: Strongly Agree.

Table 1: Operationalization Table

Variables	Definition	Operationalization	Source	Scale
Composition	The composition process is to collect and create the images in the painting.	The composition is complete, the position is suitable, the image in the picture is balanced, and there is a sense of formal beauty.	The design sketch scoring standards were established by the Sichuan Vocational College of Arts.	Score 0-5 6-10 11-15 16-20 21-25
Space	Space is perceived through length, width, and height, and possesses three-dimensional characteristics.	The spatial relations of individual objects and between objects have rich spatial levels.	The design sketch scoring standards were established by the Sichuan Vocational College of Arts.	Score 0-5 6-10 11-15 16-20 21-25
Details of objects and environments	Details in traditional painting are depictions of tiny details of objective things, reflecting the unique quality of things.	The detailed description of objects and environments is delicate, true, and complete.	The design sketch scoring standards were established by the Sichuan Vocational College of Arts.	Score 0-5 6-10 11-15 16-20 21-25
Line quality	Line in painting refers to the artist's subjective observation and use of media to show the objects in reality in a highly summarized abstract form on the picture for the audience to appreciate a symbol of expression.	The lines have certain changes, accurately representing the shape of the object and the strength and beauty of the lines.	The design sketch scoring standards were established by the Sichuan Vocational College of Arts.	Score 0-5 6-10 11-15 16-20 21-25
PU (Perceived usefulness)	The degree to which a person believes that using a particular system would enhance their performance (Kitchakarn, 2016).	1. Xiaohongshu is a good place to keep in touch with the rest of the class. 2. Xiaohongshu is a good place to get in touch with my teachers outside of class. 3. Xiaohongshu is a great place to check out class notes or homework assignments posted by a teacher. 4. Xiaohongshu is a great place to ask for help with homework assignments. 5. Xiaohongshu is a great place to check out information and announcements related to the course.	Kitchakarn, O. (2016). How Students Perceived Social Media as a Learning Tool in Enhancing Their Language Learning Performance. Turkish Online Journal of Educational Technology-TOJET, 15(4), 53-60.	5-level Likertss Agreement Scale
PEOU (Perceived	The degree to which a person believes that using	1. Xiaohongshu is easier to access from my mobile phone.	Kitchakarn, O. (2016). How Students	5-level Likertss

Variables	Definition	Operationalization	Source	Scale
ease of use)	a particular system would be free from effort (Kitchakarn, 2016).	2. It is easy-to-get materials learning on xiaohongshu. 3. It's easy to connect with others on Xiaohongshu. 4. I can easily and skilfully use Xiaohongshu. 5. The required results for searching on the download app are straightforward.	Perceived Social Media as a Learning Tool in Enhancing Their Language Learning Performance. Turkish Online Journal of Educational Technology-TOJET, 15(4), 53-60.	Agreement Scale

Reliability of instruments

The questionnaire design underwent a pilot test involving a smaller sample to evaluate respondents' ability to comprehend and navigate the instrument's questions. The objective of this pilot test was to assess the questionnaire's effectiveness with a smaller sample before its deployment with a larger sample. The distribution of questionnaires took place among Freshman students at Sichuan Vocational College of Arts, with incomplete responses excluded from further consideration.

To assess the questionnaire's reliability, a pilot test was carried out with a sample of 30 individuals who completed the questionnaire. The internal consistency reliability of the scale was evaluated using Cronbach's alpha value. As per the criteria set forth by Cronbach (1951), a Cronbach's alpha value exceeding 0.7 is considered to be indicative of "good" reliability. The resulting Cronbach's Alpha values are presented in Table 2. This pilot test approach serves to ensure the questionnaire's effectiveness and reliability in capturing meaningful data for the subsequent stages of the study.

Table 2: Cronbach's Alpha of the Constructs Measured

Construct	Cronbach's Alpha	No of Items
Perceived ease of use	0.904	5
Perceived usefulness	0.863	5

Perceived ease of use had an alpha value of 0.904, and perceived usefulness had an alpha value of 0.863. All the reliability statistics for the constructs under study were excellent as the reliability score is seen to be above 0.7. According to Taber (2018), a reliability coefficient of ≥ 0.7 or 0.6 is considered acceptable. As a result, the questionnaire for the research is considered reliable and can be employed to collect data for the research.

Validity of Research Instruments

To assess the content validity of the questionnaire items, the Item Objective Consistency (IOC) method was employed to gauge the alignment of the questionnaire items with the constructs being measured. Three subject matter experts, meeting specific criteria including possessing a master's or doctorate, having expertise and experience in education and/or relevant fields, and being university lecturers, were invited to provide ratings for each item. The objective was to determine the consistency of the items with the intended constructs.

The ratings provided by these experts revealed that all items designed to measure the constructs achieved an IOC rating exceeding 0.67. This outcome, by the findings from expert evaluations, confirms the items' validity for usage (Turner & Carlson, 2003). In alignment with the criteria outlined by Turner and Carlson (2003), these findings substantiate the validity of the items for accurately capturing the intended constructs. This validation process reinforces the robustness and precision of the questionnaire items in measuring the targeted variables.

Data Collection and Analysis

The primary focus of data collection for this study revolved around pre-test and post-test evaluations. These evaluations were designed to assess students' design sketch works across four key dimensions: composition, space, details of objects and environment, and line quality. Adhering to Sichuan Vocational College of Art's design sketch scoring standards, individual scores for the pre-test

and post-test were meticulously recorded for each participating student.

Additionally, students' perceptions of the usefulness and ease of use of the Xiaohongshu APP were gathered via a structured questionnaire survey, employing a Likert scale ranging from 1 to 5. Through the analysis of this questionnaire data, the perceived utility and ease of students in utilizing the Xiaohongshu APP for crafting electronic portfolios during the experiment were examined.

To comprehensively analyze the data, the Jamovi software was utilized. This encompassed both the exploration of data variations and the execution of descriptive analyses. Descriptive analysis was specifically employed to delve into the fluctuations in scores for each variable related to students' design sketch works before and after the instructional experiment. Moreover, the questionnaire data analysis facilitated an in-depth exploration of students' perceptions regarding the utility and user-friendliness of the Xiaohongshu APP throughout their engagement in the electronic portfolio creation process during the experiment.

Results

The presentation of results commenced by showcasing the demographic information of the sampled participants, offering valuable context. Subsequently, an in-depth exposition of the statistical outcomes from both the tests and questionnaires was provided. Hypothesis testing was conducted using the paired-samples T-test, a robust statistical method chosen to examine the significance of observed differences.

Demographic Information

Demographic Information: Statistical data about a specific group of individuals encompassing characteristics such as age, gender, income, and education. The focal group engaged in the experiment consisted of first-year students from the art design department at Sichuan Art Vocational College. The research's instructional classes were Interior Design Class 1 and Class 2 within the Department of Art Design, encompassing a total of 63 students. Notably, 3 students from Class 2 were absent due to personal reasons, resulting in a sample size of 60 individuals for this experiment.

All participants are above the age of 18 and share a foundational understanding of painting. Their painting proficiency has been validated through successful enrollment into the fine art program at Sichuan Art Vocational College. Specifically, the group comprises 31 interior design students, with 11 male students constituting 35.48% of the total, and 19 female students making up 64.52% of the total. In Class 2 of Interior Design, there are 29 students, with 11 males representing 37.93% and 18 females accounting for 61.29%.

Descriptive Statistics for Variables

The provided data presents descriptive statistics for various variables related to the students' design sketch works.

Table 3: Descriptive statistics for variables

Variables	N	Mean	Median	SD	Minimum	Maximum
Composition Pre-test	60	19.1	19	1.293	15	22
Composition Post-test	60	20.8	20.6	1.126	17.8	23.3
Space Pre-test	60	19.4	19.3	1.148	17.3	22.3
Space Post-test	60	20.9	20.8	1.115	18.8	23.3
Details of objects and environment Pre-test	60	19.6	19.5	1.223	17.3	22
Details of objects and environment Post-test	60	20.9	21	0.998	19.3	23.3
Line quality Pre-test	60	19.6	19.8	1.294	16.8	21.8
Line quality Post-test	60	21.1	21.3	1.079	18.8	23.8

The provided descriptive statistics offer valuable insights into the impact of using the

Xiaohongshu application software on students' design sketch works across various dimensions. Examining the means, medians, and standard deviations for different variables reveals noteworthy patterns. Notably, there is a consistent upward trend in mean scores from the pre-test to the post-test across all variables – composition, space, details of objects and environment, and line quality. This observable increase implies that the intervention has led to improved performance in students' design sketches after employing the Xiaohongshu application.

The alignment between median and mean values within each variable indicates a balanced distribution, further reinforcing the observed improvement. Additionally, the standard deviations signify the extent of variability around the means. Generally, these deviations demonstrate a moderate level of dispersion, indicating a relatively consistent enhancement in students' works.

The data collectively supports the study's hypothesis that utilizing the Xiaohongshu application software for creating electronic portfolios has positively influenced students' design sketch performance. Specifically, it has contributed to refining their grasp of composition, spatial arrangement, details of objects and environment, and line quality. This comprehensive improvement underscores the potential of technology integration in elevating students' artistic abilities and aligns with the study's goal of enhancing design sketch education.

Descriptive Statistics for Perceived Usefulness and Perceived Ease of Use

Table 4: Descriptive Statistics for Perceived Usefulness

Perceived Usefulness	N	Mean	Median	SD	Minimum	Maximum
PU1	60	4.17	4.2	0.211	3.8	4.6
PU2	60	4.18	4.2	0.167	3.8	4.6
PU3	60	4.21	4.2	0.155	3.8	4.5
PU4	60	4.22	4.2	0.163	3.9	4.6
PU5	60	4.21	4.2	0.151	3.9	4.6
Average	60	4.2	4.19	0.121	3.9	4.54

Table 4 presents descriptive statistics for the perceived usefulness (PU) of the Xiaohongshu application software as reported by the participants. The data provides insights into participants' perceptions regarding the utility of the software in the context of creating electronic portfolios.

Across all five items (PU1 to PU5) assessing different aspects of perceived usefulness, the mean scores consistently fall within a narrow range, specifically between 4.17 and 4.22. These mean scores indicate a high level of perceived usefulness among participants, with values above 4 signifying a positive perception on average. Additionally, the relatively small standard deviations (ranging from 0.151 to 0.211) suggest a relatively low level of variability among participants' responses.

The median scores closely align with the mean values, indicating a symmetrical distribution of responses and further reinforcing the participants' positive perception of the software's usefulness. Notably, all the median scores are equal to or slightly below the corresponding mean scores.

Overall, participants consistently rated the Xiaohongshu application software as highly useful for creating electronic portfolios, with perceptions of its usefulness consistently centered around the upper end of the scale. The small standard deviations and minimal variability further support the robustness of this positive perception. These findings validate the study's premise that incorporating the Xiaohongshu application into design sketch education can enhance students' learning experience by providing a valuable tool for portfolio creation.

Table 5: Descriptive Statistics for Perceived Ease of Use

Perceived Ease of Use	N	Mean	Median	SD	Minimum	Maximum
PEOU1	60	4.14	4.1	0.22	3.5	4.6
PEOU2	60	4.15	4.1	0.213	3.5	4.8
PEOU3	60	4.19	4.2	0.164	3.8	4.6
PEOU4	60	4.16	4.2	0.189	3.5	4.5
PEOU5	60	4.19	4.2	0.205	3.5	4.7
Average	**60**	**4.17**	**4.16**	**0.149**	**3.9**	**4.5**

Table 5 displays the descriptive statistics for the perceived ease of use (PEOU) of the Xiaohongshu application software, as reported by the participants. This data offers insights into participants' perceptions of how user-friendly the software is when used for creating electronic portfolios.

The mean scores for each of the five PEOU items (PEOU1 to PEOU5) fall within a consistent range of 4.14 to 4.19, indicating a high level of perceived ease of use among participants. These mean scores, exceeding 4, signify those participants on average found the software to be quite user-friendly. The relatively small standard deviations (ranging from 0.149 to 0.220) suggest that participants' responses exhibited relatively little variation, further supporting the consistent perception of ease of use.

The median scores closely mirror the mean values, reinforcing the positive perception of the software's ease of use. With the median scores matching or slightly below the corresponding mean scores, it indicates a relatively symmetrical distribution of responses and underscores the participants' generally favorable views.

In summary, participants consistently rated the Xiaohongshu application software as easy to use when creating electronic portfolios, with perceptions of its ease of use consistently situated around the higher end of the scale. The small standard deviations and minimal variability lend credibility to this positive assessment. These findings validate the study's premise that the Xiaohongshu application's user-friendly interface contributes to an enhanced learning experience for students engaged in design sketch education.

Hypothesis Testing Result
Hypothesis 1

Table 6: Paired Samples T-Test for Composition

		statistic	df	p	Mean difference	SE difference	Effect Size
Pre-test	Post-test	-17.2	59.0	< .001	-1.72	0.1000	-2.22

Ha1: The use of the Xiaohongshu application software for electronic portfolios contributes to enhancing students' composition proficiency.

Table 6 presents the results of a paired samples T-test conducted to analyze the changes in the composition variable scores before and after the experiment. The statistical output reveals a significant difference in composition scores between the pre-test and post-test measurements (t = -17.2, df = 59.0, p < 0.001). The p-value, which is less than the conventional alpha level of 0.05, indicates a highly significant result. The mean difference in composition scores between the pre-test and post-test is -1.72, indicating a substantial decrease in the mean composition score from the pre-test to the post-test. The effect size, represented as -2.22, suggests a substantial impact of the intervention (use of Xiaohongshu

application software) on the participants' composition scores.

In conclusion, the paired samples T-test results provide strong evidence to support the hypothesis that the use of the Xiaohongshu application software for electronic portfolios contributes to enhancing students' composition proficiency (Ha1). The negative effect size, in particular, emphasizes the magnitude of this impact.

Hypothesis 2

Table 7: Paired Samples T-Test for Space

		statistic	df	p	Mean difference	SE difference	Effect Size
Pre-test	Post-test	-16.6	59.0	< .001	-1.45	0.0878	-2.14

Ha2: The use of the Xiaohongshu application software for electronic portfolios improves students' ability to represent space.

Table 7 presents the results of a paired samples T-test conducted to analyze the changes in the space variable scores before and after the experiment. The statistical output shows a significant difference in space scores between the pre-test and post-test measurements (t = -16.6, df = 59.0, p < 0.001). The p-value, which is less than the conventional alpha level of 0.05, indicates a highly significant result. The mean difference in space scores between the pre-test and post-test is -1.45, indicating a considerable decrease in the mean space score from the pre-test to the post-test. The effect size, represented as -2.14, suggests a substantial impact of the intervention (use of Xiaohongshu application software) on the participants' space representation ability.

In conclusion, the paired samples T-test results provide robust evidence to support the hypothesis that the use of the Xiaohongshu application software for electronic portfolios contributes to enhancing students' ability to represent space (Ha2). The negative effect size further highlights the significance of this improvement.

Hypothesis 3

Table 8: Paired Samples T-Test for Details of objects and environment

		Statistic	**df**	**p**	**Mean difference**	**SE difference**	**Effect Size**
Pre-test	Post-test	-14.4	59.0	< .001	-1.37	0.0948	-1.86

Ha3: The use of the Xiaohongshu application software for electronic portfolios enhances students' proficiency in representing details of objects and environments.

Table 8 displays the outcomes of a paired samples T-test conducted to evaluate the alterations in the variable scores related to details of objects and environment before and after the experiment. The statistical analysis exhibits a significant disparity in the scores between the pre-test and post-test assessments (t = -14.4, df = 59.0, p < 0.001). The p-value, which is less than the standard alpha level of 0.05, signifies a highly noteworthy outcome. The mean difference in scores for details of objects and environment between the pre-test and post-test is -1.37, indicating a considerable reduction in the average score from the pre-test to the post-test. The effect size indicated as -1.86, signifies a significant impact of the intervention (the use of Xiaohongshu application software) on the participants' proficiency in representing details of objects and the environment.

In conclusion, the outcomes of the paired samples T-test furnish compelling evidence in support of the hypothesis that the use of the Xiaohongshu application software for electronic portfolios contributes to enhancing students' proficiency in representing details of objects and the environment (Ha3). The negative effect size further underscores the magnitude of this enhancement.

Hypothesis 4

Table 9: Paired Samples T-Test for line quality

	Statistic	df	p	Mean difference	SE difference	Effect Size
Pre-test Post-test	-17.2	59.0	< .001	-1.50	0.0870	-2.22

Ha4: The use of the Xiaohongshu application software for electronic portfolios improves students' line quality ability.

Table 9 illustrates the results of a paired samples T-test conducted to examine the changes in line quality variable scores before and after the experiment. The statistical output indicates a substantial difference in the scores between the pre-test and post-test evaluations (t = -17.2, df = 59.0, p < 0.001). The p-value, which is less than the conventional alpha level of 0.05, signifies a highly significant outcome. The mean difference in line quality scores between the pre-test and post-test is -1.50, suggesting a notable decrease in the average score from the pre-test to the post-test. The effect size, denoted as -2.22, denotes a significant impact of the intervention (usage of Xiaohongshu application software) on participants' line quality proficiency.

In conclusion, the findings of the paired samples T-test provide robust support for the hypothesis that the utilization of the Xiaohongshu application software for electronic portfolios contributes to enhancing students' line quality abilities (Ha4). The negative effect size further underscores the magnitude of this improvement.

Discussion

This study aims to bridge the gap between modern software technology and traditional design sketch classes by leveraging the XiaoHongshu application software to create electronic design sketch portfolios. The objective is to enhance students' performance in their design sketch works through this integration.

The findings reveal that integrating the Xiaohongshu app for creating electronic portfolios has a positive influence on the overall academic performance of students within the design sketch class. This impact is particularly pronounced in various areas, including composition, spatial representation, detailing objects and environments, and the quality of line work. Liu and Gao's (2022) study on the application of the Xiaohongshu app for self-directed learning in a physics class demonstrates that this interactive knowledge-sharing platform has gained affirmation from numerous students, effectively sparking their interest in learning and self-directed studies. In the context of enhancing students' intellectual development through popular new media, as explored in the study on diverse intelligence cultivation in higher education within the era of new media, it is evident from both data analysis and interview results that platforms like the Xiaohongshu app represent innovative approaches to online education in universities, contributing to the advancement of ideological and political education efforts. These outcomes underscore the efficacy of employing the Xiaohongshu application software in facilitating advancements in these crucial areas.

Moreover, the findings gleaned from the analysis of questionnaire responses indicate that students exhibit favorable feedback regarding the perceived usefulness and ease of use of the Xiaohongshu APP for creating electronic portfolios within the design sketch class. This insight highlights the promising reception and utility of the technology-enhanced approach in the educational context. Xiaohongshu's growth has positioned it as a favored marketing channel where numerous businesses collaborate to leverage user-generated content for product and brand promotion. This

collaborative approach has yielded favorable outcomes and substantiated its utility and user-friendliness in research (Hu, 2023). While there is limited research on the pedagogical utilization of Xiaohongshu for educational purposes, studies on analogous platforms like WeChat have demonstrated significant positive impacts on student learning (Yu, 2020).

Conclusion

In this study, the utilization of the XiaoHongshu application software served as an innovative approach for e-learning and curriculum exchange, allowing students to document their painting learning and creative processes. The research employed a quasi-experimental design to assess the effectiveness of incorporating the XiaoHongshu application software for creating electronic portfolios in enhancing students' performance in design sketch art. Additionally, the study investigated the relationship between students' perceptions of usefulness and ease of use of the software through a questionnaire survey.

Table 10: Summary of hypothesis testing and results

Hypotheses	Statement	Result after Analysis
H_a1	The use of the Xiaohongshu application software for electronic portfolios contributes to enhancing students' composition proficiency.	$P<0.05$, reject the null hypothesis and accept H_a1, which indicates that the use of the Xiaohongshu application software for electronic portfolios contributes to enhancing students' composition proficiency.
H_a2	The use of the Xiaohongshu application software for electronic portfolios improves students' ability to represent space.	$P<0.05$, reject the null hypothesis and accept H_a2, indicating that the use of the Xiaohongshu application software for electronic portfolios improves students' ability to represent space.
H_a3	The use of the Xiaohongshu application software for electronic portfolios enhances students' proficiency in representing details of objects and environments.	$P<0.05$, reject the null hypothesis and accept H_a3, indicating that the use of the Xiaohongshu application software for electronic portfolios enhances students' proficiency in representing details of objects and environment.
H_a4	The use of the Xiaohongshu application software for electronic portfolios improves students' line quality ability.	$P<0.05$, reject the null hypothesis and accept H_a4, indicating that the use of the Xiaohongshu application software for electronic portfolios improves students' line quality ability.

Overall, the results suggest that there are significant differences between the pre-test and post-test on all variables measured. The analysis of the experimental data led to the conclusion that integrating the XiaoHongshu application software to create electronic portfolios had a positive impact on elevating students' proficiency in design sketch art. This impact was particularly evident across four crucial dimensions: composition, spatial representation, detailing of objects and environments, and line quality. Furthermore, students expressed favorable feedback regarding the perceived usefulness and ease of use of the XiaoHongshu application software for creating electronic portfolios.

Upon the completion of the experiment, it became evident that the use of the XiaoHongshu APP to enhance traditional design sketch classes yielded favorable outcomes. Notably, the observation of a live online painting course on the XiaoHongshu platform highlighted the potential for novel teaching modes that could influence design sketch education in the future.

For subsequent research, it is recommended to consider introducing additional variable factors within an extended time frame. This could encompass aspects like the application of various painting techniques and the utilization of shades of black, white, and gray. Such comprehensive exploration

could lead to a deeper and broader understanding of the subject matter.

In essence, this study underscores the potential of integrating modern technology into traditional artistic education, revealing its positive influence on students' artistic development and paving the way for future advancements in pedagogical methods.

Recommendations

Students exhibit significant creative freedom when utilizing the Xiaohongshu application to craft electronic portfolios. This enables diverse perspectives on the same concept, fostering a comprehensive synthesis of analyses. This aspect should be further encouraged, as it promotes individuality and comprehensive learning outcomes.

The graphic and video notes featured on the Xiaohongshu platform possess the potential to garner widespread exposure among registered users. The platform's personalized content recommendations can effectively promote viewing preferences, benefiting note creators by enhancing their visibility and reach.

Moreover, the emergence of live online painting classes is a noteworthy trend. The utilization of live broadcasts for real-time painting sessions, coupled with engagement metrics like likes, introduces an innovative way to garner attention and generate interest. As demonstrated by charging tuition fees for online painting courses, the Xiaohongshu APP has the potential to evolve into a robust platform for online education and instruction. The exploration of live broadcasting as a mode of education signifies a potential transformative learning model for the future.

In light of these observations, it is recommended that the integration of diverse learning methods and modes, such as live broadcasting, should be explored further. This could potentially enhance the platform's educational offerings, providing learners with flexible and engaging avenues for acquiring new skills and knowledge.

In conclusion, the Xiaohongshu application holds untapped potential for fostering innovative and dynamic learning experiences. By leveraging its existing features and expanding into new educational frontiers, it can redefine the landscape of artistic education and online learning.

Research deficiencies and prospects

In forthcoming studies, it's recommended to extend the research timeframe. The intricate nature of the experiment, involving information collection, draft preparation, image conception, and description, underscores the importance of granting students ample time for optimal engagement. Consequently, future research could incorporate a wider range of variables in the design sketch process, such as diverse picture techniques, application of grayscale variations, and more. This approach has the potential to elevate the research's depth and scope.

Additionally, pursuing long-term research endeavors could offer a more holistic grasp of the Xiaohongshu APP's influence on students' design sketch performance. Continuous and extended research could delve into the evolving dynamics between students and the app, thus providing valuable insights into its enduring impact.

In conclusion, while the present study contributes valuable insights, the potential for broader and sustained investigations remains promising. By addressing time limitations and adopting a longitudinal perspective, future research can shed further light on the nuanced interactions between students, the Xiaohongshu APP, and their design sketch capabilities.

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