Empowering Intangible Cultural Heritage with Artificial Intelligence: The Healing Experience of Traditional Ceramic Art

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Abstract. This paper explores the application of artificial intelligence (AI) technology in the protection and inheritance of intangible cultural heritage, particularly in the realm of traditional ceramic art therapy. The article first reviews the history, importance and modern applications of art therapy, then analyzes the role of AI technology in enhancing therapeutic value and empowering intangible cultural heritage. Next, it discusses the application of virtual reality (VR) technology in the research of ceramic art therapy. It details a research programme which includes research objectives, process, and the setup of control groups, using the old age group as the target population. Finally, the paper presents future research directions and innovative prospects for AI technology in the field of intangible cultural heritage. Through refining existing systems and closely monitoring ethical issues and social impacts, it can be ensured that AI technology can truly empower intangible cultural heritage, revitalizing these ancient cultural legacies in modern society.

Keywords: Artificial Intelligence, Intangible Cultural Heritage, Art Therapy, Ceramic Art, Virtual Reality

1. Introduction

During World War I, there was a significant number of veterans who suffered from psychological trauma due to the war, leading to widespread attention to Post-Traumatic Stress Disorder (PTSD). To effectively treat these patients, the medical field engaged in extensive exploration and practice, discovering that art therapy was an effective intervention method. Art therapy, through forms such as painting, music, and dance, provided patients with a non-verbal means of expression, helping them process their inner pain and emotions and facilitating psychological recovery. This method not only showed significant results at the time but has since been regarded as an important branch of psychological therapy as theories and practices have been continuously developed.

This increases the number of people struggling with mental health problems as more people find themselves with different levels of mental problems, as society grows more competitive and an increase in the rate of life. It is in this context that art therapy with its idiosyncratic benefits has integrated into the contemporary mental health service system as an inevitable element of the system [1]. It not only enables people to have relieved their stress and manage their feelings it also makes an individual creative and enhances personal development. Nowadays due to high rates of growth of artificial intelligence technology in recent years, the implementation of computer-aided intelligence

in the sphere of art therapy became a possibility. Some of the ways in which AI can be used to extract therapy plans include the suggestion of appropriate music tracks, showing the users specific paintings exercises, or dance motions, depending on their personal preferences and feelings. This individualistic type of therapy promotes not just the efficacy of the treatment process, but also increases the convenience and prevalence of the art therapy.

Meanwhile, protection and inheritance of intangible cultural heritage is experiencing unprecedented challenges particularly when it comes to the traditional craft such as the ceramic art. In order to remove the problem with the loss of skills or the decline of the market, the application of the latest technologies, including artificial intelligence (AI), virtual reality (VR), and augmented reality (AR) can not only capture and keep the spirit of the traditional ways but also provoke the innovative approaches to the classical culture development. As an example, AI may help record the nuances of production of various ceramics, examine the traits of various styles, and VR and AR can offer people the experience of creating ceramics with the 3D experience in their hands and interest more youths in studying and exploring this ancient art form.

2. Therapeutic value of artificial intelligence technology

Artificial intelligence (AI) technology has its therapeutic value, which is expressed in many ways. When applied in the production of digital art, machine-learning algorithms are employed to create distinctive digital artworks, and the participants can use them to produce their own works by engaging with the algorithms. The very creative process is helpful in relieving stress and expressing oneself. It is possible to create art in a particular style through AI and give the user a unique artistic experience depending on their preferences. Regarding music therapy, AI may be applied to create music, creating the right tune depending on the emotional state of the user to allow one to relax the mind. Through the analysis of physiological indicators or variations in the face expression AI can modify the rhythm and style of the music to better correspond and control the emotions of the user.

In the case of interactive art setups, like one with virtual reality (VR) or augmented reality (AR) an immersive artistic experience is developed to assist people to forget the weight of the real world at least, temporarily. These installations are able to react and create interactive art effects through variable and dynamic ways using sensors that capture the movements or sounds of the user [2].

Visual art therapy can use AI in analyzing drawings or graffiti of users, with positive feedback and suggestions, which promotes the confidence and imagination of participants. Through the help of AI, the display colors will be able to be adjusted in order to make the users feel calmed down or be in a better mood by analyzing the impact of various colors on the individuals. Regarding therapeutic aids, chatbots are useful in providing emotional support, whereby the user is able to share their feelings with the chatbot and the chatbot is able to respond positively to the emotions. AI can create guided meditation videos or voice to guide people to the deep state of relaxation. Online platforms in social connectivity generate a link amongst individuals with similar interests, which fosters artistic exchange and sharing, giving an individual a sense of belonging and support community. People can also perform and create art remotely, which endures relationships between people, even in other places because of the AI technology.

3. Technological empowerment of intangible cultural heritage

Artificial intelligence (AI) is becoming a more significant part of protection and inheritance of intangible cultural heritage with the emerging technology. The field of art restoration and reconstruction is the most likely to see the use of AI technology in artistic restorations because methods like deep learning are effective to recreate lost or threatened art forms. To illustrate, in ancient murals, sculptures among other artworks, artificial intelligence can examine existing pieces

or documentation and combined with the expert knowledge, make sensible inferences and reconstructions of missing parts (Figure 1).

Figure 1. Jingdezhen ceramic metaverse exhibition hall

Moreover, it is possible to reproduce the scenes and activities of the intangible cultural heritage with the use of VR/AR technology, and the participants can experience them directly and strengthen their cultural identity. As an illustration, the Central Academy of Fine Arts, which teamed up with Fengyuzhu, designed an exhibition, The Vanishing Old Summer Palace (Figure 2), consisting of a mass immersive VR environment.

Figure 2. The Vanishing Old Summer Palace immersive VR experience exhibition

AI also reveals its own benefits in the context of strengthening social awareness and interest in intangible cultural heritage. Through the development of interactive platforms based on virtual reality (VR), augmented reality (AR) and such likes, the user is able to experience a comprehensive cultural experience interactively at the comfort of their homes. An example is that the Jiading digital cultural tourism app is based on VR, AR, and AI to develop AIGC cultural tourism short movies like The Light of Jiading or through an AR application like Baidu, one can point the smartphone camera to certain places and see the historical stories and cultural introductions about the places (Figure 3). Such innovate ways not only bring the traditional culture in more vivid and interesting forms to people but make young people interested in traditional arts which encourages to spread culture and evolve it. In the meantime, intelligent dialogue systems are also a significant kind of interactive experience. The chatbots and other such technologies engage with users and they introduce the stories and meaning of the intangible cultural heritage. As an illustration, the Dali Museum has applied Deepfake technology to produce variations of portraits created by Dali in an effort to revive the artist who

narrates the history of the masterpieces or reports of recent events (Figure 4). The interaction also involves creation of learning and entertaining games that enable the users to understand and have real experiences with ICH. See, as an example, the Shanghai Tianyan Pingtang Astronomical Experience Museum, which is a combination of astronomical and gaming, the game Snow Prints on the Clay, which combines literary research and enables the viewers to discover the stories behind the texts of history through the game.

Figure 3. Chinese AIGC cultural tourism short film, The Light of Jiading

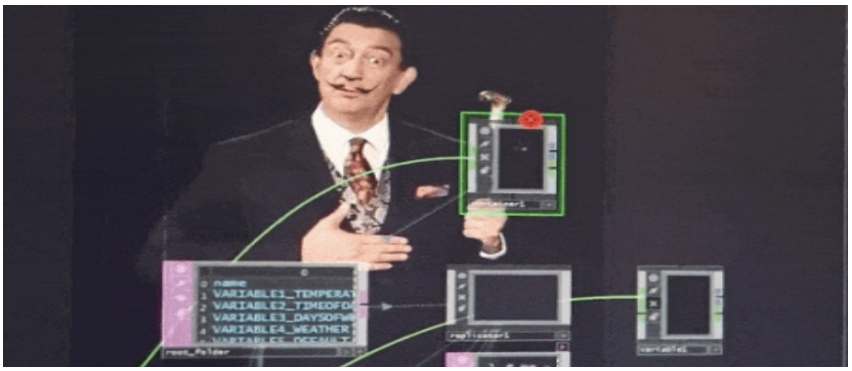

Figure 4. Dali Museum AI artificial intelligence Dali

Due to threats to intangible cultural heritage (ICH) that are posed by natural disasters and human activities, as well as other risks, artificial intelligence (AI) is the effective and intelligent solution. With the help of satellite remote sensing, drone patrols, and other hi-tech technologies, it is possible to monitor the status changes of the significant cultural heritage sites in real-time and thus to detect possible risks in time and avoid them. Additionally, big data analysis AI systems can assist managers to learn more about the tourist behavior patterns, the strategies to manage scenic areas better, and eliminate or mitigate risks of negative effects brought about by over-tourism. By these actions AI offers high technical assistance of the long term protection of ICH.

ICH and art therapy have a deep association. Most aspects of ICH like traditional music, dancing, drama and handicrafts are useful conduits of human emotional expression. Not only do they hold a rich historical and culture information but they also have special psychological healing properties. Mental health problems are gaining more prominence in the contemporary society wherein people go through numerous demands and pressures, and ICH forms of art offer a viable solution to eliminate them. As an example, one can listen to the calming effects of traditional music or even do some activities of folk dancing to make people relax and free themselves of anxiety and depression. Traditional handicrafts do not only help in improving personal creativity and manual skills but also help in boosting self esteem and confidence [3]. Moreover, the instrument of the ICH transfer is also interactive and communicative and creates ties between individuals and establishes a harmonious relationship in society, which also plays a powerful role in combating mental health. Summing up,

ICH is not just a valuable spiritual heritage of the Chinese nation, but also a valuable resource, which should be sought by modern people to find a consolation to the soul and psychological healing.

The modernization is growing fast thus posing unprecedented challenges to the traditional ceramic art. A break in the skills transmission through the older generations of ceramic artists has been brought about by the retirement or passing of the older generation of ceramic artists. Concurrently, young people are no longer eager to study on the old methods due to the speedy contemporary living. All this is because mass-produced ceramic crafts flood the market at the expense of the traditional handicrafts. Deficit of innovativeness causes extreme homogenization of the works and restriction in technical opportunities prevents the attainment of complicated designs. The problems do not only jeopardize the existence of the traditional forms of ceramic art but they also act as a warning to the preservation of the cultural heritage. With these challenges arising, the role of technology in responding to them is also assuming a growing significance. The next section outlines how the traditional ceramic art can be empowered by the modern technology, in particular, artificial intelligence and virtual reality. This does not only preserve and transmit this intangible cultural heritage but it also changes it into a therapeutic tool to deal with well-known psychological health problems in contemporary society. Through technology, one can just revive the art of ceramics and provide a new path through which this traditional form of art can contribute even more to the healing field.

4. Ceramic art therapy under virtual reality technology

This research project explores the potential application of virtual reality (VR) technology in the field of ceramic art therapy. The aim is to design and implement a psychological health intervention plan targeting elderly individuals with mild to moderate depression. Art therapy has been proven to effectively improve the psychological well-being of older adults and enhance their quality of life [4]. The immersive experiences provided by VR help increase the attractiveness and engagement of therapeutic activities [5]. This population, due to physical limitations, a decline in physiological functions, and a shrinking social circle, is often prone to feelings of loneliness and depression. Traditional psychological treatment methods may not fully meet their needs. For those elderly who are immobile, especially those who cannot easily visit pottery studios, VR technology offers a way to participate in pottery activities from home. Some elderly individuals may have limited dexterity in their hands due to arthritis or other conditions, making fine manual operations difficult. With the advancement of technology, VR devices have become more user-friendly and widely accessible, enabling elderly individuals to easily engage with and use them. In a virtual environment, they can complete creative tasks through simplified and assisted interaction methods, enjoying the fun of pottery. For those with social anxiety or phobias, virtual communities provide a relatively safe interactive platform where they can communicate with other participants without the pressure of face-to-face interactions. In the virtual environment, elderly individuals can try various creative tasks without fear of failure or making mistakes. This pressure-free environment helps enhance their confidence and creativity. Meanwhile, Immersive 3D video game training has been shown to improve hippocampal memory function in older generations [6]. This paper will refer to the approach in "Making Art Therapy Virtual: Integrating Virtual Reality into Art Therapy with Adolescents," which combines VR technology with traditional art therapy methods to improve the effectiveness of treating anxiety and social difficulties in adolescents [7].

The first step that will be undertaken in the study will involve creation of a virtual reality based ceramic art creation platform designed considering the elderly. This platform will enable the participants to feel the whole process of pottery including choosing of materials till the production of a product in the virtual world. Putting on VR devices, the old will be able to enjoy the process of creativity, as well as be free to select various kinds of clay, tools, and decorative materials. The

research team will cooperate with professional psychologists and other proficient ceramic artists in creating interactive tutorials and inventive instructions that can fit well with the elderly people to make sure that every member is able to pursue personalized creation that interests them and level of competence.

The research will also establish a control group whereby the traditional ceramic art therapy will be used in a non-virtual setting. This method will ensure singling out of individual impacts of the virtual reality technology in enhancing the psychological wellbeing of the aged population. The effectiveness of virtual reality ceramic art therapy will be examined by comparing the psychological health of the subjects sampled in the study, such as the scores of depression, life satisfaction, etc., through the enhancement of the psychological health of the participants in a regular fashion. The final goal is to verify whether this method can effectively improve the psychological health and quality of life of the elderly and provide a scientific basis for the design of future similar interventions.

Integrating the virtual reality (VR) technology with art therapy, specifically, ceramic therapy, has certain peculiar benefits compared to the traditional methods of art therapy. With regards to immersive experience, VR technology enables the participants to participate in creation in a completely simulated environment. This dreamlike experience allows them to concentrate more on the creative process eliminating outside stimulation and thus engaging more in the therapeutic process. The virtual world does not restrict players with the physical resources, but it can experiment more with creative and technical methods, this encourages the placeholders to think and imagine. In addition, therapists can make therapeutic sessions in the VR environment personalized to each participant, depending on the particular requirements of the individual. The settings can be changed so that they offer individualized treatment plans that will ensure that the process is not frustrating as the participants advance.

The system of VR can store and document data regarding the user behavior in an automatic way (e.g. the decided options in the creation process, reaction time, and so on). These records are rich analysis data to the therapists since they can be able to evaluate the success of the treatment and make adjustments on time. This creative process allows the participants to see their work in an external perspective thus creating self-awareness and personal development by replaying their work.

VR technology provides an intuitive entryway to an absent-minded elderly person who will have no experience in pottery. They will be able to acquire the simplest skills with the help of step-by-step training and virtual tutors. The virtual environment offers better courses and professional advice to those who already have a certain degree of knowledge, and therefore they can continue to improve their craft. Geographical borders do not have the power to divide the virtual community whereby older people living in various parts of the world can convene together in one platform and exchange their labor and thoughts to increase socialization. It fosters online projects that involve the elderly, through the virtual environment, the elderly are able to collaborate on their online projects, which will improve their teamwork skills. Several behavioral data in the creative process can also be documented through the VR system and assist the therapists measure the progress of the participants and make timely changes to the treatment plans. Members will be able to analyze their creative process, where to work on, and improve their skills in self-reflection (Figure 5).

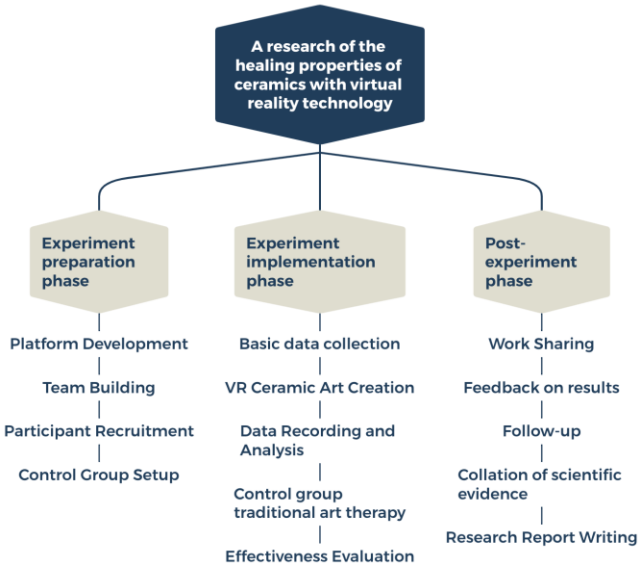

Figure 5. A framework for ceramic art therapy research targeting the elderly under virtual reality technology

Note: Research on the Therapeutic Potential of Ceramic Art Under Virtual Reality Technology

4.1. Experimental preparation phase

The preparation phase involves the experimental preparation. Development of a Platform: Create a ceramic art piece platform that runs on the virtual reality platform, and the platform can recreate the whole process of making ceramic goods, starting with the selection of materials and the final product.

Any virtual models such as different types of clay, tools, and decorative materials should be introduced into the virtual environment to be selected and used by the users. Team Formation: Call in professional psychological counselors and experts in ceramics to form part of the research team to jointly create interactive tutorials and creativity directions specific to the elderly members.

Participant Recruitment: Find enough people of the older age with mild to moderate cases of depression and make them experimental subjects.

Control Group Design: Have a control group aligning with the VR group: being a ceramic art therapy with a non-virtual environment.

4.2. Experimental implementation phase

Baseline Data Collection: Conduct mental health assessments for all participants before the experiment, including metrics such as depression scores and life satisfaction.

VR Ceramic Art Creation: Guide participants to wear VR devices and enter the virtual ceramic art creation platform. With tutorials and guidance, participants freely select materials and tools to create ceramics.

Data Recording and Analysis: The VR system automatically records user behavior data, such as material selection and response times during the creative process. Periodically collect participants' mental health data for comparative analysis with baseline data.

Control Group Traditional Art Therapy: Participants in the control group engage in traditional ceramic art therapy in a non-virtual environment. Similarly, collect their mental health data.

Effect Evaluation: Assess the effectiveness of virtual reality ceramic art therapy by comparing the mental health data of the two groups. Verify whether the VR approach effectively improves the mental well-being and quality of life of elderly participants.

4.3. Post-experiment phase

Result Feedback: Provide participants with feedback on the experiment results, including their performance in art creation and improvements in mental health.

Work Sharing: Encourage participants to share their creations and experiences in a virtual community to enhance social interaction.

Follow-up Monitoring: Conduct follow-up monitoring of participants to evaluate the long-term effects of art therapy.

Scientific Basis Compilation: Organize experimental data and results to provide a scientific foundation for designing similar intervention measures in the future.

Research Report Writing: Write a research report and publish the findings to offer references for both academic and practical fields.

5. Innovation and prospects

Artificial intelligence technology opens new pathways for the inheritance and development of intangible cultural heritage, particularly through the integration of virtual reality (VR) technology with art therapy in the field of ceramic treatment, demonstrating unique advantages that go beyond traditional art therapy approaches. Although this study has limitations, such as the need for more time to conduct in-depth experimental research and to further explore the potential combination of VR with other art therapy methods, we recognize the importance of combining theory and practice. In future work, we will continue to refine existing systems and closely monitor ethical issues and social impacts to ensure that AI technology can truly empower intangible cultural heritage, revitalizing these ancient cultural legacies in modern society.

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