Sculpture Training Before the Development of Digital Sculpture and Artificial Intelligence (AI): A Comparison of Some Sculpture Undergraduate Programs in Vietnam and the USA

Vo Van Lac[1]

Abstract

This article analyzes the impact of digital technology and AI on traditional sculpture, emphasizing the need to update Sculpture training programs in Fine Arts Universities in Vietnam. Based on survey data on the awareness of experts about the influence of AI in the field of sculpture and on the results of comparing the Sculpture training programs of domestic and foreign training schools in the Sculpture industry. The author has outlined training objectives, developed output standards, and created a knowledge system to equip learners with the skills, knowledge, and attitudes needed for modern job roles.

Keywords: *Training, Traditional Sculpture, Digital Sculpture, AI*

INTRODUCTION

The development of digital sculpture and AI (AI) has had a profound influence on art and design. This trend challenges Fine Arts universities to devise specific solutions for sculpture training programs, equipping students with digital technology skills and AI applications in learning and creative practices.

Trends in virtual and augmented reality are growing, fueling an increasing demand for experiencing art through technology. This reflects a shift in how the public appreciates art and aesthetic values. In response, universities must update training programs to help students master both traditional tools and emerging technologies on multimedia platforms, enabling them to engage in creative activities.

The field of sculpture is associated with traditional craft activities that typically use materials such as bronze, stone, wood, and plaster to create works serving the needs of life decoration. In fact, in Vietnam, there are only three State Universities participating in training: Vietnam University of Fine Arts, Ho Chi Minh City University of Fine Arts and Hue University of Arts (central Vietnam). In particular, the Sculpture program of the Vietnam University of Fine Arts has existed and developed for nearly 100 years, associated with the French building the Indochina College of Fine Arts in Hanoi. However, after a long period, the training program has changed very little. These limitations challenge sculpture graduates to sustain and develop their careers in response to societal needs. For that reason, the current sculpture majors of three universities in Vietnam have very few candidates registering to train in this major every year. Many universities risk closing this major. Meanwhile, the demand for this type of sculpture in society is very large.

A current issue is: 1) It is necessary to orient and set goals for the Sculpture training program scientifically and in accordance with social trends and international integration; 2) Build output standards for the training program combining traditional and digital technology elements; 3) It is necessary to rebuild a suitable program

[1] Faculty of Creative Technology, Van Lang University, Ho Chi Minh City, Vietnam E-mail: lac.vv@vlu.edu.vn

structure, meeting output standards between the parties' expectations about job positions and creative activities in the digital technology environment.

OVERVIEW

The Development of Digital Art and AI

This section provides an overview for evaluating the influence of digital sculpture and AI on artistic creativity. The article has researched and commented on the research of domestic and foreign scientists to show a development trend of digital sculpture and AI that is affecting the creativity of artists.

Sculpture is a visual art form that traditionally relies on materials such as wood, metal, clay, and plaster to create works that reflect social life and express the artist's personal style and emotions (Gavin Gao, Kai Xing, 2023).

With advances in technology, 3D printing and digital sculpture are gradually replacing traditional sculptures that artists create manually from tangible materials. The emergence of 4D scanners, 4D printing, and virtual sculptures has increased efficiency and influenced societal demand (Bay Raitt and Greg Minter, 2000). The application of 4D scanning effectively solves the problem of creating sculpture products and becomes an important tool in the current technological context (M. Y., Tong, H., Shen, L., Wang, R. X., Zhang, F., Zhang, Z. C., Hu, Q. W., Zhu, Y. X., and Zhang, H., 2015). Based on the foundation of current advanced techniques in handling problems in sculpture art, making sculpture products increasingly widely influences the public.

Technology and art increasingly merge, transforming 2D static shapes into dynamic 3D images that captivate audiences. More and more artists in the fields of sculpture, printing, painting, etc. are attracted to and pursue and express them. Artists have applied different digital forms and tools to create many works with rich aesthetic values (Andrade et al., 2012). Currently, the subjects of 3D printing, 3D scanning, data modeling, digital technology, and digital sculpture creation are taught, but at a rudimentary level (Yang, 2022). These studies are not welcomed in universities that are training in traditional fine arts because the majority believe that digital sculpture will lose the artist's emotions and lack creativity and personal style.

Through the research of Marian Mazzone and Ahmed Elgammal, it is argued that AI can collaborate with artists to expand the creativity of both sides. The researchers also tested the comparison of AI with photography and sculpture and proposed AI as a new artistic medium, opening up a new definition between artists and art (Marian Mazzone, 2019). Along with that trend, according to author Triyono Bramantyo in the work "Digital Art and the Future of Traditional Art," the emergence of digital art and sculpture, especially virtual reality and augmented reality, will directly impact traditional art. The author concluded that digital art is not a replacement for traditional art but a supplement and extension, creating new opportunities for creativity and artistic expression (Triyono Bramantyo, 2021). Authors Joanna Black and Tom Chaput have discussed the benefits and disadvantages of AI in art education in secondary and higher education. Among them are the limitations of personalization in learning and experience and engaging interactions. The author has also raised the issue of using AI leading to plagiarism and the possibility of reducing student creativity (Joanna Black, Tom Chaput, 2024). Regarding art education and AI, some researchers acknowledge the potential challenges related to the authenticity of AI-generated art; the dependence on technology will lead to ethical issues and personal rights. They argue that AI has a potential impact on artistic creativity (The Impact of AI on School Photography and Visual Arts, 2024). In her study, Debora Pazetto Ferreira examined and explored the potential benefits of incorporating AI into art teaching, which will improve student learning outcomes and enrich teaching methods. The author proposes expanding the adaptability of AI-based art teaching, improving intelligent teaching methods, and enhancing the experience of AI-based art teaching (Debora Pazetto Ferreira, 2019). Some are concerned that AI could eventually replace human artists and that AI-generated art products could be more creative, of higher quality, and productive (Hong and Curran, 2019; Tubadji et al., 2021).

Based on the views of many researchers, the level of AI will greatly affect visual arts education in general and sculpture in particular. AI is also a big challenge for traditional art fields such as sculpture, where most artists

have to work manually and manipulate traditional materials as they do today, and this raises the question: how should we respond in the face of such AI developments affecting the sculpture industry?

RESEARCH METHOD

- Theoretical research method: a review of domestic and international studies provides an overview for evaluating the impact of digital sculpture and AI on art.

- Investigation method: using surveys to assess the current state of the training program and gather attitudes and perceptions of artists and students regarding AI in artistic creation.

- Comparison method: the author compares with current training programs of Vietnamese schools: Sculpture training program of Vietnam University of Fine Arts; Sculpture training program of Ho Chi Minh City University of Fine Arts; Sculpture training program of OTIS University of Art and Design, USA; Sculpture, SCAD University, USA.

Based on the methods, the article will propose some solutions to develop the current sculpture training program for Vietnamese universities. It will serve as a reference for experts and educators in the field of art and sculpture.

Attitude and assessment of the influence of AI in the field of art and sculpture

To establish a quantitative basis for assessing attitudes toward AI's impact on sculpture training and creation, the author surveyed 56 lecturers, students, and artists currently active in sculpture and art education.

Questionnaire: "Artificial intelligence will replace some of the current stages of the visual artist".
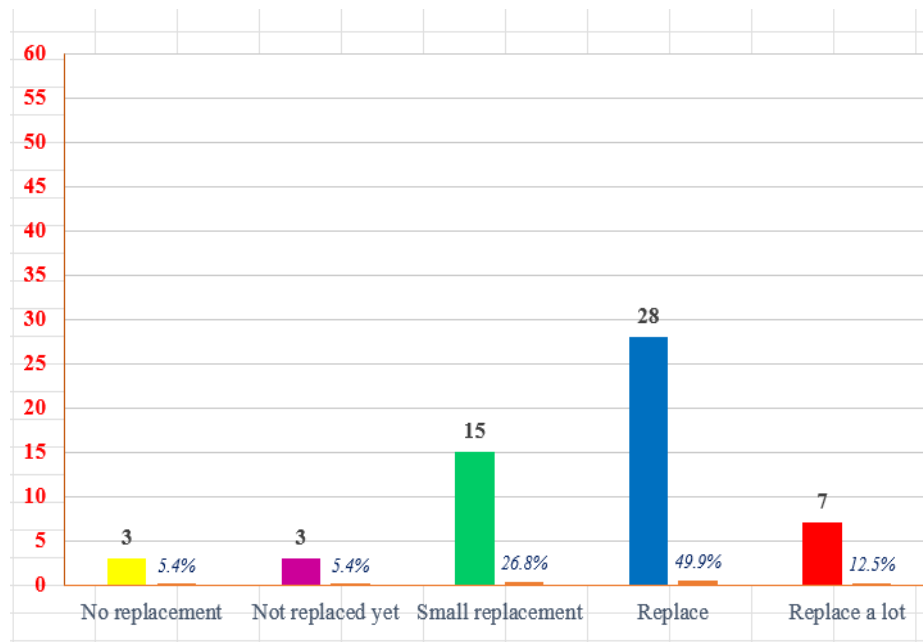

Figure 1: AI's Role in Supporting Visual Artists' Creative Work

The results showed that up to 49.9% said that AI can replace and 12.5% replace many.
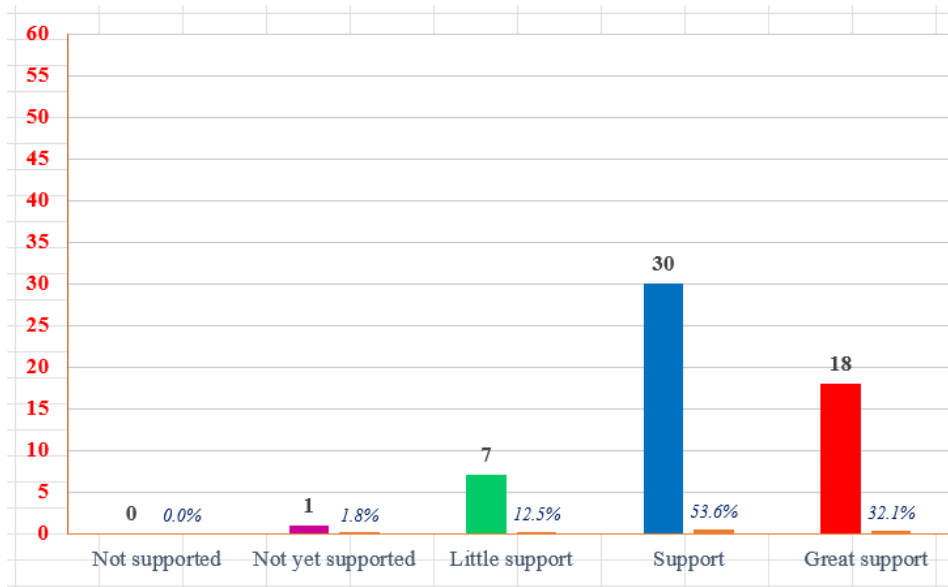
Figure 2: AI's Projected Impact on Training Quality for Visual Artists

For the survey question, "Will artificial intelligence support the creative work of visual artists in the future?" 53.6% of respondents answered "yes," while 32.1% indicated "significant support".
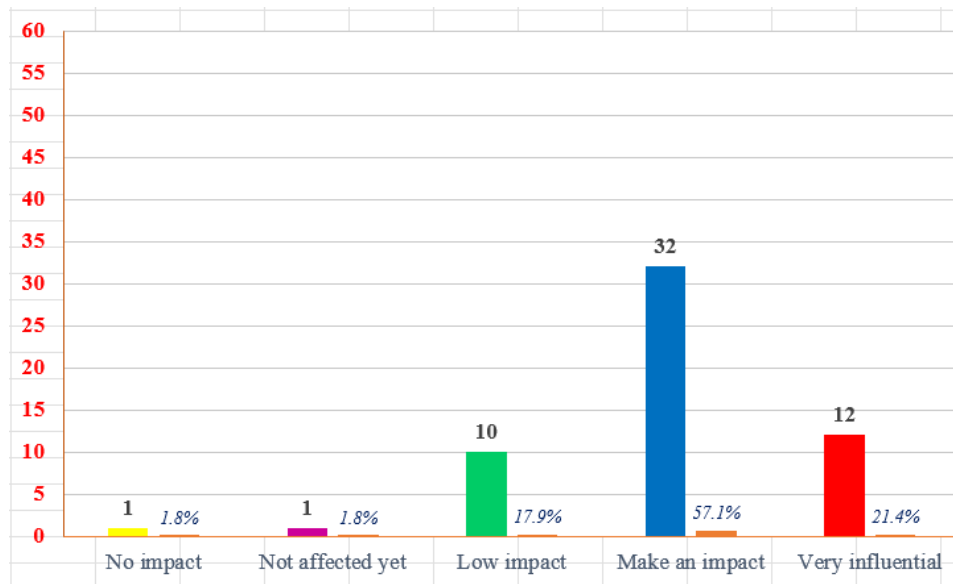

Figure 3: The chart on Will artificial intelligence affect the quality of current training of visual artists?

The survey question "Will artificial intelligence affect the quality of current training of visual artists?" The results showed that 57.1% said it would affect; and 21.4% said it would greatly affect.
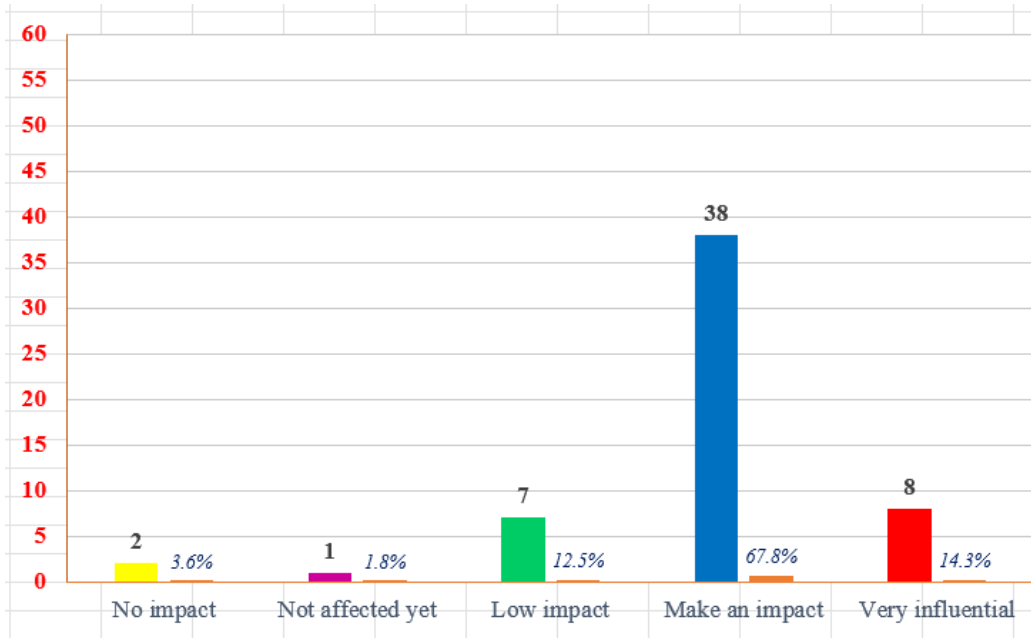
Figure 4: The chart on Will artificial intelligence affect the quality of current training of visual artists?

The survey question is "Will artificial intelligence affect the current training of visual artists?" The results were 67.8% affected and 14.3% very affected.
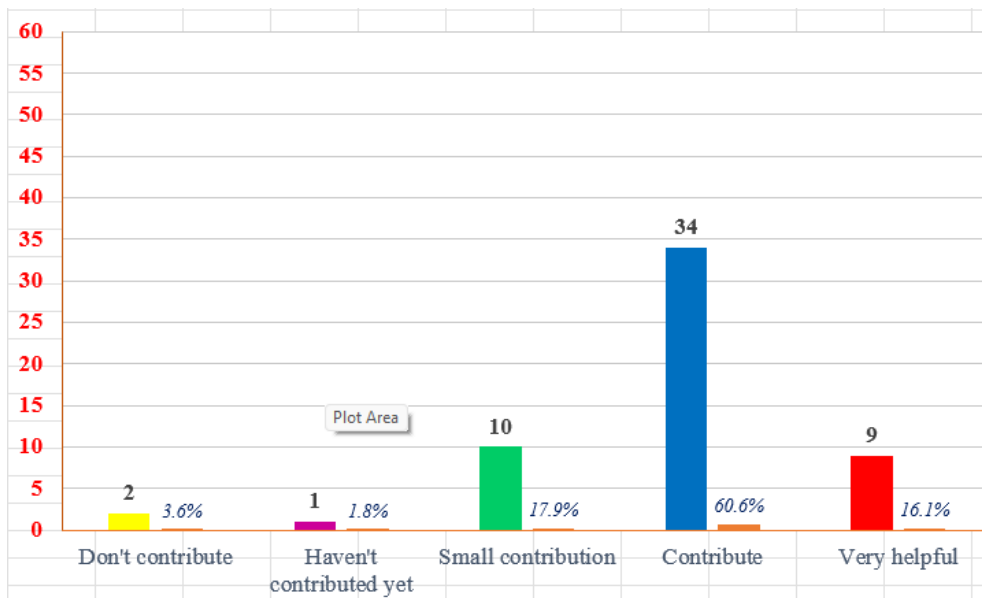

Figure 5: The chart on Artificial intelligence will contribute to improving creativity and promoting product value

The survey question "Artificial intelligence will contribute to improving creativity and promoting product value". The result is that 60.6% said it contributes, and 16.1% very much contributes.
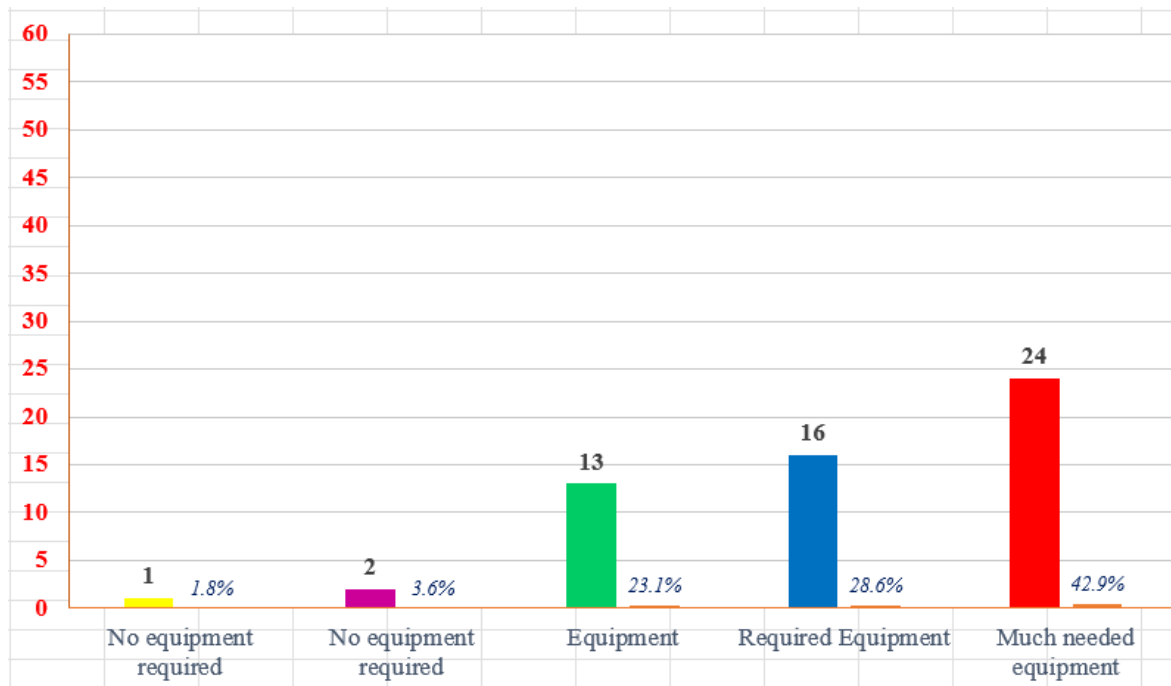
Figure 6: The chart on In the training program of the sculpture industry, it is necessary to equip knowledge about artificial intelligence and digital technology

Survey question "In the training program of the sculpture industry, it is necessary to equip knowledge about artificial intelligence and digital technology". The result is 42.9% very necessary and 28.6% necessary.

Based on the survey results on the level of AI's impact on the quality of current training and the level of need to equip AI knowledge in the current training process, creating university programs is very necessary. Through the attitude survey data, it shows that the majority of artists and lecturers participating in the survey believe that AI will affect the quality of current training and AI will also contribute to making the creativity of artists richer and more diverse. The survey results show an overall picture of the views of lecturers and artists today, with the majority assessing that AI affects current creativity and training.

Comparing the training program of Sculpture in Vietnam and some foreign schools

To have an overview in analyzing and evaluating sculpture training programs in and outside the country, the article compared four programs: two American training programs and two Vietnamese sculpture training programs. Thereby, we can see the similarities and differences between the training programs.

Table 1: Comparing the training program of Sculpture in Vietnam and some foreign schools

Sculpture training programs in the USA		Sculpture training programs in Vietnam	
Sculpture training program, OTIS College of Art and Design, USA.	Sculpture Training Program, SCAD University, USA	Sculpture training program, Vietnam University of Fine Arts	Sculpture training program, Ho Chi Minh City University of Fine Arts
Program Outcomes: Develop clear ideas based on research, draw sound conclusions, and think openly, challenging social stereotypes. Students should express abstract concepts in tangible forms, create art skillfully with appropriate techniques, and understand the role of art in a social context. They should also demonstrate creative and impactful presentation skills,	**Program Outcomes:** Become a public artist, director, or artist in studios; proficient in all aspects of the profession; ability to manage public art projects, serve architecture and production, and install in all spaces.	**Program Outcomes:** Basic science of visual arts; theory of art history; ability to create sculpture; traditional and modern material techniques; technological knowledge; communication and research of specialized documents. Skill Group: Mastery of material techniques; ability to create unique sculpture forms; proficiency in	**Program Outcomes:** Demonstrate proficiency in English, information technology, political theory, and foundational knowledge of fine arts history and theory. Students should be capable of independent creation, participate in workshops and exhibitions, master various sculpture genres and materials, and conduct theoretical research. They should also convey knowledge effectively, comply with copyright regulations, appreciate national cultural identity, and seek continuous improvement in their qualifications.

awareness of professional standards, and adherence to industry norms.		equipment use; and practical research skills. Soft Skills Group: Project management and implementation for sculpture works, communication and collaboration abilities, aesthetic promotion, and IT application skills. Attitude group: Having ethics and awareness in work; being open to learning, helping, and updating knowledge.	
Courses in the program Foundation knowledge: 27 credits: Form and space; Color and design; Contemporary studio and creative activities; Visual culture; Writing and exploration; Social sciences, Natural sciences and Mathematics.	Foundational knowledge: 35 hours of teaching in the subjects: Drawing, Design and Applied Color.	Program structure General knowledge: 63 credits: including subjects of political theory, law, English, Art history, Fine arts, Plastic anatomy, Architectural expression, Near and far law, Ancient art research. And includes elective subjects of graphics, photography, and sculptural materials.	Program structure General knowledge: 64 credits: including subjects of political theory, law, English, Art history, Fine arts, Psychology of artistic creation, Scientific research methods, etc.
General Education (36 credits): Core courses include Studio Work, Major Electives, and courses in Global Arts and Cultures, Contemporary Art, and Creative Arts and Literature. Skills-based courses cover advanced fabrication techniques, 3-D output technologies, video, audio, Digital Media, and Global Cultures Seminar, as well as electives in Advanced Ceramics and Sculpture.	General education includes 60 hours: Including subjects: Ideas and speech, Management and business, Visual culture and context, Digital media; 20th century art, Aesthetics, electives in Mathematics and natural sciences.	Industry Fundamentals (23 credits): Subjects include Drawing, Sculpture in the Round, Design Diagrams, Perspective, and Modeling.	Basic knowledge of the industry: 23 credits. Including subjects: Plastic anatomy, Architectural expression, Near and far law, Ancient art research, Specialized English, Architectural planning design.
Specialized knowledge 43: Working and discussing with guest artists; Studio learning and creative action; elective major, elective ceramic, and advanced sculpture materials; Work in the studio with the instructor to create works and personal projects (Sculpture, 2024).	Specialized knowledge: 75 hours, including subjects: Construction, structure and materials; Concepts of shape; Molding technology; Expression in cast metal; Material exploration; Digital tools for fine arts; Light, sound, and projection; Business and professionalism for fine arts; Exhibition planning; Collaboration and production in creative industries; Applied principles: Physical computing; Fine arts internship (Sculpture, 2024).	Specialized knowledge 106 credits. Including subjects: Up to 6 subjects of research sculpture; 4 subjects of research relief; 9 subjects of creative sculpture; 4 subjects of creative relief; 5 subjects of materials; Presentation and mold making skills; Professional practice 20 credits, divided into 4 practical practice subjects. The graduation exam is 15 credits (Three public, 2024).	Specialized knowledge: 154 credits. Including subjects: 14 subjects of round sculpture; 3 subjects of drawing; 10 subjects of specialized layout; Model design; 5 subjects of material engineering; Graduation sketch; 5 subjects of practice; Elective knowledge 6 credits and designed 6 subjects on material content: Drawing, Woodcut, Silk material; Graduation exam 3 subjects: Political theory, Graduation essay, Works, (Works Bachelor's degree program, 2024).

Developing a sculpture training program that approaches international trends and is suitable for AI development Trends

Analysis based on comparing domestic and foreign programs shows that creating a university-level sculpture program is aligned with today's societal needs and is essential to integrate interdisciplinary arts. Clear goals and output standards should be developed to match the skills required for a sculptor's role in the digital age.

The goal of the sculpture program needs to be determined based on the vision and core values of each training institution and in line with the internationalization trend and the growing era of digital technology and AI. It is crucially important to provide a clear and specific orientation on the profession based on an interdisciplinary approach to solve the tasks of the traditional sculpture and digital sculpture fields in today's era.

OUTPUT STANDARTS

The program's output standards should be defined across 10–12 core areas. These include three standards for knowledge, one for general knowledge, and two for specialized knowledge. The skill group should include six standards, covering Professional Skills, General Skills, Research, and Critical Thinking. Finally, Autonomy and

Responsibility should be represented by two standards. Based on the objectives and twelve output standards, the article proposes the following content to guide the output standards and knowledge system:

Output standard 1: Apply knowledge of social sciences, politics, and law. Design the subjects: Political theory, Culture, Aesthetics, Art history, Visual cultural theory, Law, etc.

Output standard 2: Apply knowledge of creative theory, aesthetics, Law of distance and anatomy, marketing, materials, and visual principles. Design the subjects: Creative methodology; Aesthetics, Art studies, Marketing, Visual principles, Material composition principles, etc.

Output standard 3: Applying technological knowledge and AI in creating and manufacturing works in the field of Sculpture. To meet this output standard, it is necessary to design the following subjects: Zbrush, Maya, 3D Max, Principles of operation and operation of CMC machines, Digital technology in visual communication, 3D printing techniques, Application of AI in creating visual arts.

Output standard 4: Proficiently apply skills in using traditional and digital shaping tools. Design the subjects: Drawing, Reality, Round statues, Reliefs, Monumental statues, Mural paintings, Digital sculpture, etc.

Output standard 5: Proficiently apply interdisciplinary skills in creative work activities. Design the subjects: Photography, Architectural expression, Sand table model, Urban landscape design, Monumental painting, Visual communication, etc.

Output standard 6: Proficiently use applied information technology and foreign languages. Design the subjects: Basic and advanced office informatics, Basic and specialized foreign languages, etc.

Output standard 7: Proficiently use teamwork skills and design the subjects: Team leadership, Professional practice, Organizing exhibition events, Organizing specialized seminars.

Output standard 8: Effectively apply verbal, written, and multimedia communication skills. Design the subjects: Presentation skills, Document drafting skills, Personal profile presentation.

Output standard 9: Design and implement surveys for research and design the subjects: Scientific research methods, Design methods, Construction techniques, Material techniques.

Output standard 10: Apply critical and creative thinking and design the subjects: Presentation skills, Innovation in Contemporary Sculpture, Thematic reports to professional councils, Participation in professional workshops.

Output standard 11: Demonstrate moral qualities, sense of responsibility, and compliance with the law. Design the subjects: Sculpture and community responsibility, Copyright and intellectual property law, Qualities of creators, National identity in creativity, etc.

Output standard 12: Develop clear future career orientation, lifelong learning awareness, and entrepreneurial spirit. Design the subjects: Lifelong learning, Advanced program to postgraduate level, Creative entrepreneurship, Sculpture and market, etc.

From the 12 Output standards and the above knowledge system, the Sculpture training program should be designed according to the following majors: 1) Traditional Sculpture major; 2) Digital Sculpture major: 3) Urban Sculpture major (monumental). Each major should have two in-depth orientations. For example: Traditional sculpture majors should focus on wood, metal, etc. Digital sculpture majors should focus on: Digital sculpture in the application direction or Digital sculpture in the art direction. The focus on majors and specializations creates conditions for students to register to study according to their strengths and interests, and from there, nurture their passion and embark on a creative path.

Teaching Methods

To achieve these 12 output standards, the program must adopt teaching methods aligned with contemporary trends. Most of the subjects of the sculpture industry at Vietnamese schools are currently focusing on Creative Practice Methods, taking shaping skills and material techniques as the main focus. Therefore, the

communication and teaching methods are more vocational than orienting thinking and methodology in sculpture.

For the university program in Sculpture, the first thing to do is to change the approach to interdisciplinary knowledge: Painting, Architecture, Communication, Industrial Design to expand the search and expression of works that are contemporary and in line with social trends.

With the development of AI, from art creation and design to art analysis and interpretation, AI has become a valuable tool in the course, promoting creativity, expanding artistic vision and enhancing the learning experience (The Impact of AI on School Photography and Visual Arts, 2024). Traditional training methods are becoming unsuitable and boring for learners and do not address the knowledge and skills that businesses need. Therefore, each subject must have clear goals and output standards. On that goal, it helps learners develop their qualifications and talents to achieve the expected results. In addition, it enhances the ability to work practically, linking the teaching content of some subjects with the practical works of leading professors, helps to learn through projects to enhance interaction and solve practical problems. From there, learners can improve their creativity and problem-solving skills.

In fact, it is not the question of replacing but for supporting learners, as AI has found a place in art education, where it is being used to train future artists. From virtual art tutors to AI-powered critique systems, AI has the ability to provide personalized guidance and feedback to students, helping them hone their artistic skills and develop their unique artistic voices. (The Impact of AI on School Photography and Visual Arts, 2024). The training program must reduce unnecessary things, to help learners invest in thinking about language and materials and creative solutions that AI can't replace.

The curriculum must incorporate contemporary art forms such as Installation art, Terrain art, and Environmental art to guide each project. In short, the influence of AI on visual arts education has been transformative. Through its role in art creation and design, AI broadens artistic vision and encourages experimentation. In art analysis and interpretation, AI provides insights and contextual information, enriching students' understanding and critical thinking. Furthermore, AI-powered systems provide personalized guidance and resources, nurturing the artistic development of future artists.

CONCLUSION

Updating and enhancing the sculpture training program, including establishing relevant output standards, is essential to align training with societal needs. This alignment also enables learners to engage with new aesthetic trends and inspire the public through innovative art. Fine Arts universities should adopt policies that advance the current sculpture training program. This includes integrating multi-platform approaches and AI to develop suitable learning and assessment methods, thereby enriching creative output and meeting industry needs for diverse aesthetic expressions.

REFERENCES

Andrade, B. T., Mendes, C. M., de Oliveira Santos, J., Bellon, O. R. P., and Silva, L. (2012). 3D preserving XVIII century Baroque masterpiece: Challenges and results on the digital preservation of Aleijadinho's sculpture of the Prophet Joel. Journal of Cultural Heritage, 13(2), 210–214. https://doi.org/10.1016/j.culher.2011.05.003

Black, J., and Chaput, T. (2024). A discussion of artificial intelligence in visual art education. Journal of Computer and Communications, 12, 71–85.

Bramantyo, T. (2021). Digital art and the future of traditional arts. International Division, 1997-0854 (Print), 2587-6341 (Online). https://doi.org/10.33779/2587-6341.2021.1.096-110

Gao, G., and Xing, K. (2023). Virtual sculpture for art education under artificial intelligence wireless network environment. International Journal of Web-Based Learning and Teaching Technologies, 18(2).

Hong, J. W., and Curran, N. M. (2019). Artificial intelligence, artists, and art: Attitudes toward artwork produced by humans vs. artificial intelligence. ACM Transactions on Multimedia Computing Communications and Applications, 15(2s), 1–16. https://doi.org/10.1145/3326337

Ho Chi Minh City University of Fine Arts. (2024, June 15). Education Program Structure: Sculpture Department. Retrieved from https://hcmufa.edu.vn/admin/runtime/files/Tin%20tuc/NAM%202019/KHUNG%20CT%20DAO%20TAO/3%20Khung%20chuong%20tr%C3%ACnh%20Dieu%20kh%E1%BA%AFc.pdf

Ho Chi Minh City University of Fine Arts. (2024, July 15). Undergraduate Program Outcomes, School of Fine Arts. Retrieved from
https://www.hcmufa.edu.vn/admin/runtime/files/Thong%20bao/2021/Th%C3%A1ng%2012/123_QD%20DHMTHC M%20chuan%20dau%20ra%202020_compressed%20(1)(1).pdf

Mazzone, M., and Elgammal, A. (2019). Art, creativity, and the potential of artificial intelligence. Arts, 8(26). https://doi.org/10.3390/arts8010026

Ministry of Culture and Fine Arts of Vietnam. (2024, September 7). Public Disclosure of Educational Quality Assurance, 2022-2023. Retrieved from https://mythuatvietnam.edu.vn/ba-cong-khai/3-cong-khai-ve-dam-bao-chat-luong-giao-duc-nam-hoc-2022-2023.html

Otis College of Art and Design. (2024, August 13). Sculpture New Genres Curriculum. Retrieved from https://www.otis.edu/programs/undergraduate/bfa-fine-arts/curriculum/sculpture-new-genres

Pacific Northwest College of Art. (2024, August 10). Sculpture Requirements Curriculum. Retrieved from https://pnca.willamette.edu/academics/bfa/sculpture/requirements-curriculum

Pazetto Ferreira, D. (2019). Artificial dreams: Contemporary intersections between art and technology. The Polish Journal of Aesthetics. https://doi.org/10.19205/52.19.2

Raitt, B., and Minter, G. (2000). Digital sculpture techniques: How to apply the principles of traditional sculpture to make stunning 3D characters. Nichimen Graphics.

Savannah College of Art and Design. (2024, July 8). Sculpture Program Overview. Retrieved from https://www.scad.edu/academics/programs/sculpture/degrees/bfa

The Impact of AI on School Photography and Visual Arts. (2024, April 29). TeachFlow. Retrieved from https://teachflow.ai/the-impact-of-ai-on-school-photography-and-visual-arts/

Yang, Z. (2022). Application and development of digital enhancement of traditional sculpture art. Scientific Programming, 2022, Article 9095577. https://doi.org/10.1155/2022/9095577