The Significance of Developing Advanced Higher Order Thinking Skills in China's Arts Education

Yang Yang[1], Yee Mei Heong[1]*

[1] *Faculty of Technical and Vocational Education,*
   Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, MALAYSIA

*Corresponding Author: mhyee@uthm.edu.my
DOI: https://doi.org/10.30880/jttr.2024.02.01.003

Abstract

Arts education has an integrative role in promoting the intellectual, aesthetic and emotional growth of students. Arts education not only develops students' professional skills, but also helps them develop holistically. To achieve good results in the arts, students need to be innovative. In China, arts education has been innovating, however, challenges remain, including the use of standardized testing, gaps in educational resources, and teacher pedagogy, all of which affect the development of students' innovative abilities. Higher order thinking skills (HOTS) play a key role in students' academic success and innovation; HOTS encourages critical analysis, fosters creative problem-solving skills, and prompts innovative thinking, which helps art students to improve their thinking skills and develop their creative abilities. Currently, there is a lack of consensus and widespread application of HOTS in Chinese art programs. the integration of HOTS with arts education becomes crucial in ensuring students' cognitive development as they cope with the challenges posed by social development.

1. Introduction

It is increasingly recognized that the arts contribute significantly to students' academic achievement, and that arts education contributes to students' aesthetic development, as well as the development of thinking and creativity (Jin & Ye ,2022). People can acquire cognitive skills from various courses and can satisfy emotional and spiritual needs through the study of various forms of art, such as dance, music and drama. Arts education is an integrated process that can help students grow intellectually, mentally, aesthetically, and emotionally (Paulsen & Wassal, 2021).

Arts education has traditionally focused on developing students' technical skills and visual perception. However, in today's rapidly evolving world, creativity and innovation skills have become essential for success in various fields, including art (Donghwy & Nara, 2018). Innovation is a critical skill in the art industry. Innovative performances by students can bring new perspectives to artistic endeavors, give things a special and fresh meaning, and produce results that satisfy not only themselves but others (Wang & Jiang, 2022). Art students need to be able to think creatively and produce new and original works to succeed in their careers. For students studying art to achieve good artistic success, it is necessary to develop their thinking skills and improve their innovative performance (Helena et al., 2023).

The six stages of Bloom's taxonomy are remembered, understand, apply, analyze, evaluate, and create. The last three levels are called HOTS (Anderson & Krathwohl, 2001). Students with HOTS are generally better able to cope with obstacles, solve problems, and meet the demands of educational activities, making HOTS one of the key components of education (Kwangmuang et al., 2021). Higher HOTS often lead to better student performance

(Benidiktus et al., 2017). According to Bloom's taxonomy, creativity is the highest level of thinking, and students who find novel solutions to challenges become creative (Megati et al., 2020). HOTS helps students think critically, analyze works of art in depth, and improve their thinking skills, thus enhancing creativity (Gordon et al., 2022).

2. Review of The Literature

2.1 The Definition of Arts Education

Education is pivotal for personal growth, with arts education forming the bedrock of human experience. It encompasses teaching diverse artistic expressions like music, dance, drama, and visual arts. The goal is to equip students with art knowledge, skills, and creativity, nurturing lifelong learners who are critical thinkers and adaptable to change. Arts education is essentially a fusion of "education" and "art," serving both as a general field offering educational value rooted in artistic experiences and as a professional realm fostering skills specific to the arts (López, 2016).

In China, arts education holds dual definitions: narrowly, it pertains to training artists or professionals, while broadly, it forms the essence of aesthetic education (Chen, 2023). Higher arts education in China aims at holistic student development and nurturing creativity (Xu & Pan, 2022). China's Education Modernization 2035 emphasizes cultivating well-rounded individuals with moral, intellectual, physical, and aesthetic growth. arts education in China supplements mainstream education by fostering interests and aesthetics.

Contrarily, European and American arts education focuses on personality and holistic development, associating it with personal growth and critical thinking. It's seen as a means to nurture creativity, self-expression, and overall competence. In these regions, arts education is viewed as a pathway for self-expression, communication, and judgment development. Students become art connoisseurs with profound knowledge and unique judgment skills. Here, arts education transcends art, extending into various fields (Chen, 2023).

2.2 Type of Arts Education

Arts education is an aesthetic educational activity using literature, music, art, etc. as artistic means and content. Art is an open concept that depends on constant development. Recognizing and understanding each of the different categories of art not only allows us to enjoy art more, but is also essential to help us understand the role of art in our lives and in history. Forms of artistic expression have evolved throughout human history, and each different art form is experienced differently and affects our emotions and feelings.

Generally the types of art include verbal arts (e.g. literature), visual arts (e.g. painting, sculpture), performing arts (e.g. dance, music), and integrated arts (e.g. film, theater, etc.). Among them, literature, drama, painting, music, dance, sculpture, and architecture can be called the seven recognized art disciplines (Meng, 2022).

Table 1 *The 7 major art disciplines and their characteristics*

No.	Art Disciplines	Characteristics
1	Literature	A way and means of expressing the objective world and subjective perception using spoken or written words as a medium. In modern times, literature is usually divided into four categories: poetry, fiction, prose, and drama (plays).
2	Drama	The stage performance art that uses language, movement, dance, music, puppets and other forms to achieve narrative purposes. There are various forms of theatrical performances, commonly including drama, opera, dance drama, and musicals.
3	Painting	The use of tools and materials such as brushes, board brushes, knives, inks and paints on textiles, wood, walls, etc. Painting also includes the use of this artistic act together with graphics, composition, and other aesthetic methods to express the concept and meaning that the author wishes to express.
4	Music	An art form or cultural activity that includes the composition of music (songs, tunes, symphonies, etc.), performance, the evaluation of music, the study of music history, and the teaching of music.
5	Dance	A performing art that uses the body to perform a variety of graceful or difficult movements. Dance is generally accompanied by music and is an art form in which rhythmic movements are the main means of expression.

6	Sculpture	A form of plastic art, an art form that constructs three-dimensional forms in space. Sculpture carries the thoughts of its creators and records the culture and customs of different regions, nationalities and artists in various historical periods.
7	Architecture	A kind of stylistic art based on the engineering technology of architecture, which mainly plays aesthetic functions through the modeling and structural arrangement of spatial entities, the combination of related arts, and the relationship with the natural environment.

2.3 Importance of Art Education

From an educational point of view, the tangible results of artistic activity are not the only thing that concerns us. The state of mind and the hobbies that arise from it are also important, helping to raise people to a higher level of life and evoking a passion for creativity through the creation of art forms and the discovery of beauty. In terms of the relationship between human beings and society, arts education contributes to the enrichment of human emotions and will, to the development of the human personality and overall progress, to the ability to connect people's own culture to the wider world and to improve understanding of multiculturalism.

Due to the way today's society is structured, there is a high demand for innovation, creativity, analytical thinking and strong interpersonal skills. The arts are a channel for learning because they contribute to human development in terms of understanding and learning about a variety of subjects. It helps people to express their true feelings and bring out their creativity, and promotes independent thinking and critical thinking, teaching people to observe and understand society more thoroughly.

The study of art facilitates the formation of a proper understanding of the world and human beings, in the process improving one's aesthetic level and enabling one to better deal with oneself in relation to the world and others. For example, there is a large body of literature linking the arts in education to positive psychology, where the arts encourage students to express their emotions and thoughts creatively through a variety of artistic techniques. It contributes to the development of students' emotions, aesthetic perception and understanding. In addition, arts education provides an understanding of what is positive, meaningful, and valuable, all of which allow for the acquisition of moral, humane, and beautiful character (Hallam, 2018).

On a personal level, through arts programs, students can develop higher-order thinking skills, creativity, and problem-solving abilities. Arts education aims to encourage students' autonomy in the learning process. Its affective component distinguishes art from scientific thought and its impact on the curriculum, thus adding value to general education (Vazquez-Marin et al., 2022). Arts education enhances critical thinking and decision-making skills. When students are allowed to make their own decisions, their ability to think critically, think creatively, analyze concepts and use their imagination is stimulated so that they can create original works, including plays, theatrical productions and music, based on their own ideas.

2.4 Challenges in Arts Education in China

China's education evaluation system is usually based on standardized tests and grades, which is a drawback of China's traditional education system and may inhibit students' desire to innovate (Yao, 2023). Because they are more concerned with getting good grades than venturing into new fields, this limits some students' attempts to innovate outside of traditional fields, leading to a lack of innovation (Deng, 2022). The evaluation of students is only limited to the assessment of discipline and scores, while ignoring the performance of students in the classroom, such as learning methods, thinking skills, and daily life performance (Heng, 2018).

As the traditional Chinese education system overemphasizes test-taking and rote memorization, this may lead students to focus more on imitation and repetition, and they often respond to school exams and assessments by imitating popular art styles or copying masterpieces, rather than cultivating independent and creative thinking (Wen & Sun, 2022). Over-reliance on rote memorization and copying from textbooks leads to low levels of creativity and originality. Coupled with the fact that in some art fields, market demand and commercial considerations may make students more inclined to create works that meet market demand and cater to the aesthetics of the general public rather than truly pursuing personal innovation and expression, limiting students' ability to explore new art styles (Yao & Jun, 2018).

In addition to the shortcomings of China's education system, which have caused the problem of students' lack of creative ability, the cultivation of students' high-level thinking ability has been neglected in China's art education at present. Students' thinking does not go beyond the low-level thinking of memorization, comprehension, and application (Pan, 2019). Students' thinking is at a lower level, which also exacerbates the problem of students' low innovative ability.

Currently, art education in China still needs to deal with many challenges, including policy, conceptual, and practical dilemmas. China's education system traditionally belongs to test-based education, which focuses more on patterned tests and test scores (Yao, 2023). Students tend to adopt rote memorization of knowledge. This type

of education system is not conducive to cultivating students' practical skills and innovative thinking. Rigid educational systems tend to place less emphasis on developing students' thinking skills, and students generally have low levels of higher thinking, leading to a lack of innovation and independent thinking (Yao & Jun, 2018).

There is also an urgent need to improve the teachers' strength and teaching quality in schools and institutions (Song & Song, 2023). First, some teachers still lack continuous and in-depth learning and application of professional knowledge and educational theory knowledge, while the development of art specialization requires the team to continuously improve the comprehensive quality and multi-faceted exploration and practice. Secondly, some teachers do not have enough theoretical research on pedagogy, and they are not clear about educational goals, curriculum, educational methods, and evaluation.

Art education in China lacks an interdisciplinary approach, and the teaching of art is often separated from other disciplines or not emphasized (Xu, 2021). This limits the development of students' creative thinking and all-round skills. In addition, resources and facilities are limited in some areas. While China's big cities have better-equipped art schools and institutions, many remote areas lack appropriate art education resources and facilities (Fu & Mo, 2022). The imbalance of educational resources hinders the development and growth of arts resources in many places. Chinese students and parents usually prioritize employment. The community and parents do not have a deep enough knowledge of art education and lack of support (Zhang & Zhao, 2018), which may lead to the perception that art education is of low value for future employment prospects.

The curriculum also needs to emphasize social practice and attention to students' individuality. Some teachers do not change the original traditional teaching methods and pay too much attention to the teaching of theoretical knowledge without setting up enough practical teaching sessions (Hu, 2016; Xu & Pan, 2022). The possibility of a standardized curriculum leads to a lack of individualized attention for students in art education (Cheng, 2022). Artistic development often requires individualized instruction and feedback. It is critical that curriculum should prepare students for evolving artistic practices.

2.5 The Definition of Higher Order Thinking Skills

Human thinking skills can be divided into two broad categories: lower order thinking skills (LOTS) and higher order thinking skills (HOTS). Higher-order thinking, also known as higher order thinking skills (HOTS), has been widely recognized as an important set of tools for cognitive development. HOTS is defined as cognitive processes that require the application of analytical, evaluative, and creative thinking to solve complex problems (Anderson & Krathwohl, 2001) and refers to cognitive abilities that allow individuals to analyze, synthesize, evaluate, and create new ideas or concepts.

HOTS is based on a taxonomy of learning and is relevant to educational reform. These skills are critical to success in the 21st century and are closely related to creativity and innovation and are considered essential for success in academic and professional settings because they enable individuals to think critically, solve problems, and make decisions. HOTS are cognitive skills that go beyond the recall and reproduction of information and include the ability to analyze, evaluate, synthesize, and apply knowledge to solve complex problems (Krathwohl, 2002). Aspects of analysis, synthesis, and evaluation have been found to be associated with higher levels of cognitive development (Hopson et al., 2001; Anat & Dori, 2003).

Specifically analyzing, evaluating, and creating are known as HOTS. Analyzing is the breakdown content into its components and decides how the sections contribute to each other. Evaluating is the requirements and norms for making judgment. Creation is the process to combine elements into cohesive patterns and recognize elements into new design (Anderson & Krathwohl, 2001). Currently, HOTS is a fundamental requirement of the knowledge age and has become a widespread consensus in the international education community (Yueh et al., 2022).

2.6 Type of HOTS Model

Several model typologies of HOTS have been developed, including Bloom's Taxonomy (Bloom, 1956), The Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001), Marzano's Taxonomy (Marzano & Kendall, 2007), and Webb's Depth of Knowledge (Webb, 1997). Each model emphasizes a different aspect of HOTS. These models provide educators with a framework to design instruction that promotes HOTS.

Bloom's taxonomy (1956) is a widely used framework for understanding HOTS. The concept of "higher order thinking" is derived from Bloom's taxonomy of educational goals (Lewis & Smith, 1993). Bloom's taxonomy is used to organize the cognitive functions that we use in our instructional programs. It organizes learning objectives according to their complexity. Bloom (1956) proposed that educational activities are divided into three domains: cognitive (knowledge), affective (attitude or self), and psychomotor (Manual or Physical skills). Learning outcomes and educational goals in the cognitive domain were classified and evaluated at six levels: knowledge, comprehension, application, analysis, synthesis, and assessment. in 2001, Anderson and Krathwohl updated the original taxonomy to include remember, understand, apply, analyze, evaluate, and create. The terminology changed from nouns to verbs, the essential meaning of the concepts did not change, and higher-order thinking skills belonged to the last three levels of Bloom's taxonomy.

Despite the influence of Bloom's taxonomy on educational practice, later research has taken a new turn. Based on Bloom's Taxonomy, Marzano and Kendall developed a new classification system for educational goals. Marzano's taxonomy presents a complete theory of learning that integrates the latest findings from brain-based learning literature. (Marzano & Kendall, 2007).

Marzano's taxonomy consists of two interacting dimensions: the domain of knowledge and the level of processing, and according to Marzano's taxonomy, the domain of knowledge involves three elements: information, mental processes, and psychomotor processes. Information: This is what we usually understand as "knowledge". Mental processes: represent procedural knowledge, that is, "how to do". Psychomotor processes: are complex physical activities. Processing levels are often divided into three (cognitive, metacognitive, and internal or ego), but in practice they are usually divided into six sublevels, which are the depths to which students acquire new knowledge.

In 1997, Dr. Norman Webb developed "Depth of Knowledge", or DOK. The DOK theory and methods point to the design of instructional tasks, activities, and assignments as learning tools that promote deep learning and active engagement of students and become instructional design tools that foster higher-order thinking (Francis, 2016). The framework consists of 4 levels, with level 1 being the simplest and level 4 being the most complex. Bloom's taxonomy measures the level of cognition students are expected to demonstrate, whereas DOK focuses more on the context - the scenario, environment, or situation - in which students are expected to express learning. Bloom's taxonomy requires students to master lower levels of cognition before moving on to the next level. In DOK, students transition fluently at all levels when measuring assessments.

2.7 Background of HOTS in China's Arts Education

HOTS is the current hot spot of international education research. Governments around the world have paid great attention to the cultivation of HOTS in students, and it has become an important part of the core literacy of student development in many countries.

A review of Chinese research on HOTS reveals that the cultivation of HOTS is still in a state of ambiguity in Chinese art curricula and even in general education teaching practices. Mainly, the concept of HOTS is ill-defined, there is a lack of unified consensus on HOTS, and the use of HOTS is not widespread. Most of the articles on upgrading students' thinking and cultivating HOTS refer to HOTS as "deep learning". One of the deep learning studies that has been accepted by many researchers is Bloom's taxonomy (He & Xu, 2015; Gu & Lu, 2023). Deep learning corresponds to the four levels of Bloom's taxonomy of cognitive domain: application, analysis, evaluation, and creation. China's research on deep learning started relatively late, and the main research results have focused on academic papers on the characteristics, understanding, and implementation strategies of deep learning (Liu & Yang, 2018; Pan, 2019; Zhan et al., 2022).

The National Standard for Teaching Quality of Undergraduate Specialties in General Colleges and Universities, issued by the Chinese Ministry of Education, specifies the disciplinary foundations of various specialties, the objectives of talent cultivation, and so on, and puts forward requirements for colleges and universities to formulate their corresponding professional cultivation objectives. To cultivate students' innovation ability, it is necessary to improve their thinking level and cultivate their high-level thinking, but in the National Standard for Teaching Quality of Undergraduate Specialized Categories in General Colleges and Universities, there is a lack of a clear definition of students' HOTS, and there is a lack of guidance on how to cultivate and improve students' thinking level.

The neglect of HOTS also contributes to the lack of development of higher-level thinking and independent thinking training for students. HOTS is used for advanced cognitive processing of information, and it is activated when a person is mentally aggregating deeply processed and manipulated information (Drew, 2023). However, the current educational approach in higher art education does not go beyond basic information memorization and recall, neglecting the need for students to think deeply and critically about concepts and ideas, which in turn hinders students' ability to come up with innovative solutions to complex problems (Fu & Mo, 2022). It is difficult to nurture HOTS from a passive teaching model based on reading, listening, and lecturing (Saido et al. 2018). It requires more participative methods in which students actively engage in discussions, practice, and teaching others (Shridhar et al. 2021).

Overall, research related to HOTS started abroad around the 1970s and only took off in China around 2000. There is not yet a broad consensus on the connotation of HOTS. In terms of the total number of studies, research on the teaching and development of HOTS, the use of specific disciplines, and the measurement and evaluation of HOTS is not yet large and needs to be improved. In existing research, the definition of HOTS adopts the idea of "what are the components of higher-order thinking", which is directly manifested in different combinations of various terms (problem solving, critical thinking, creative thinking, metacognition, decision making, reasoning, logic, reflection, etc.), and the types of HOTS that appear relatively more frequently are problem solving, critical thinking and creative thinking.

Existing research will define HOTS using several different terms. Scholars in China basically draw on foreign definitions when defining HOTS. Quite a few studies are carried out by directly drawing on existing frameworks when evaluating HOTS, of which the most widely used framework is mainly Bloom's taxonomy. Both the research results of China's core literacy for student development released in 2016 and the Opinions on Deepening the Reform of the Education System and Mechanisms in 2017 point to the need to develop students' cognitive abilities

2.8 Importance of HOTS for Arts Education

HOTS refer to an individual's engagement in the deep processing of information. In the art-making process, where students analyze and evaluate their learning tasks, make decisions about creative approaches and materials, and synthesize different perspectives to create new works of art, HOTS can serve to help students think creatively to solve problems. In addition, arts education encourages students to think critically about art and the world around them. By studying art history and different art styles, students learn to analyze and interpret artworks and consider the cultural and historical context in which they were created, which promotes the development of critical thinking skills and an appreciation for diversity and different perspectives (Ozga & Cudo, 2022).

Innovation and creative thinking are the foundation of artistic creation, in which students analyze and evaluate their learning tasks, make decisions about creative approaches and materials, and synthesize different perspectives to create new works of art. HOTS is considered key to developing creative skills and is essential for students to become independent, self-directed learners. Higher Thinking can be used to help students think creatively to solve problems.

The Partnership for 21st Century Skills identifies critical thinking and problem solving, communication, collaboration, and creativity and innovation (4Cs) as essential skills that students need to possess in contemporary society. HOTS is one of the main factors that enable individuals to meet new challenges in the 21st century. The use, connection or manipulation of past knowledge is also important in HOTS in order to solve new problems effectively.

HOTS is also the ability of students to enable them to face challenges, difficulties, problems, or dilemmas. HOTS helps students to be prepared for challenges throughout their lives. That is why HOTS can be used to predict student success (Tanujaya et al., 2017). Familiarizing students with HOTS is important to help them prepare to solve problems, adapt to new situations, and make decisions about specific issues (Samsul Hadi et al., 2018). In addition, art education encourages students to think deeply and critically about the art forms they are studying. These skills enable students to analyze and evaluate art forms and to develop innovative ways of creating art. Students need to apply critical thinking and problem-solving skills to enhance creativity and promote a deeper understanding of artistic knowledge and professional skills.

21st century learning is characterized by the development of thinking skills, the ability to communicate and collaborate with students in problem solving through the integration of technology in learning (Nisak & Yulkifli, 2020). Critical thinking becomes an essential skill for 21st century learners (Tseng, 2020). Critical thinking was first referred to as 'higher order thinking skills' in the taxonomy developed by Bloom, Englehart, Furst, Hill & Krathwohl (1956) to provide a classification of forms and levels of learning. The development of critical thinking skills is not only valued in Western countries, but also in China. In the last decade, the Chinese government has encouraged student mobility as one of the means to improve knowledge and skills. Critical thinking is seen as a necessary lifelong competency that enables people to play an active role in a democratic society (Kuhn, 2019).

Enabling students to be creative and guiding them to create unique and valuable artworks is an important goal of higher art education. HOTS are considered critical to addressing issues in higher education because they allow students to enhance their cognitive skills, move beyond superficial understanding, and engage with complex and abstract concepts (Lu et al., 2021). In HOTS, self-regulated learning skills refer to the ability to actively manage learning, monitor progress, and adjust to achieve specific educational goals, including skills such as critical thinking, time/management, or metacognition (Zimmerman, 2008).

According to Ahmed et al. (2017), HOTS is an important component of education because of its benefits in improving students' academic performance, reducing weaknesses, interpreting, synthesizing, problem solving, and controlling information, ideas, and daily activities. Teachers' knowledge and competencies play a key role in ensuring effective deployment of HOTS to enhance student learning outcomes. Therefore, the development of learning models, teachers' knowledge and skills, and learning resources are necessary to facilitate HOTS for learners (Retnawati et al., 2018).

3. Methods of The Study

In this study, a systematic review method is employed to identify, evaluate, and analyze the impacts of higher-order thinking skills on art education. To conduct the literature search, several relevant databases were selected, including ScienceDirect, Scopus, Google Scholar, and CNKI (China National Knowledge Infrastructure), to ensure a sufficiently broad coverage of the literature. These databases encompass a wide range of academic journals

and research fields, ensuring access to comprehensive and high-quality literature on higher-order thinking and art education.

To ensure the retrieved literature is highly relevant to the research topic, the following keywords were identified and used for the search: "higher-order thinking skills," "artistic innovation performance," and "art education." The search was limited to the period from 2018 to 2023 to ensure the timeliness of the research.

During the literature screening process, irrelevant articles and those outside the specified time frame were excluded by reading the titles and abstracts. Only studies that directly discuss higher-order thinking and art education were retained. Ultimately, nearly 60 relevant articles were kept for further analysis. Key information was extracted from these articles, including the authors, publication year, research objectives, methods, and main findings.

The selected literature was then subjected to a detailed evaluation by thoroughly reading the full texts and assessing the research design, data collection, and analysis methods of the included studies to ensure their reliability and scientific rigor.

4. Conclusion

Arts education makes an important contribution to students' personal growth and learning. In China, arts education in covers aesthetic education and professional training of artistic talents, with the main purpose of cultivating students with aesthetic ability, artistic literacy and innovation However, arts education in China still has certain deficiencies and faces multiple challenges in terms of policy, concept and practice.In today's fast-developing society, innovation has become a key factor for success in all fields, including the arts. Students need to have excellent creativity and a high level of thinking in order to succeed in the arts. HOTS are crucial for students to develop in art education. HOTS helps to develop students' creativity, independent learning and problem-solving skills, which in turn better equips them to cope with the new challenges posed by the development of society.

The findings of this study will provide crucial and significant information for education policymakers and curriculum developers in the design and implementation of arts education methods. Based on the findings of this study, detailed and clear delineation of the levels of thinking skills that students should achieve can be made in the curriculum and student development plans. This helps to clarify students' learning objectives and provides specific and actionable guidance for educators in practice, enabling them to more effectively cultivate students' critical thinking, problem-solving abilities, and creativity in arts courses. The results of this study can also assist education policymakers in understanding the current deficiencies and challenges in arts education, thereby formulating more scientific and reasonable policies and strategies. This will promote the innovation and optimization of teaching methods, enhancing the overall quality of arts education. For curriculum developers, the data and analysis results provided by this study will serve as valuable references for developing new curricula and improving existing ones. They can design more targeted teaching content and activities based on the research results, gradually fostering students' independent thinking, creative problem-solving, and comprehensive artistic innovation abilities.

Research combining HOTS and arts education can provide valuable insights for schools to improve their arts education practices. The application of HOTS in arts education requires comprehensive updates and modifications to existing curricula, teaching methods, and assessment strategies. In-depth exploration of the integration of HOTS and arts courses can help schools identify shortcomings in existing curricula and improve or develop their arts course content based on these findings. This not only enhances students' experience in arts courses but also stimulates their interest in learning and creativity. In terms of teaching methods, HOTS enable art teachers to devise more diverse instructional strategies. For example, through project-based learning, problem-oriented learning, and collaborative learning, teachers can create an environment conducive to active thinking and creativity development among students. These research outcomes not only help improve arts education practices but also provide references for educational reforms in other disciplines, promoting innovation and development across the entire education system.

By understanding HOTS and how to apply these skills, art teachers can not only impart specialized art knowledge but also optimize the learning environment, develop students' HOTS, and enhance their creative expression in the field of art. This serves educational goals and maximizes students' learning outcomes, thereby improving their academic achievements and further elevating the overall level of education. In art classes, systematic thinking training can significantly improve students' HOTS such as analysis, evaluation, and synthesis. The development of these skills not only strengthens students' critical thinking and problem-solving abilities but also inspires their artistic creativity, enabling them to better express personal artistic concepts and explore new art forms. Through such teaching practices, arts education will transition from traditional skill teaching to cultivating students' innovative capabilities and depth of thinking. This shift not only meets the demands of modern education but also provides new ideas and directions for the sustainable development of arts education on a global scale.

Acknowledgement

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

Yang Yang confirms sole responsibility for the following: **study conception and design, and manuscript preparation;** *Yee Mei Heong confirms sole responsibility for the following:* **reviewed and approved the final version of the manuscript**.

References

Ahmad, S., Prahmana, R. C. I., Kenedi, A. K., Helsa, Y., Arianil, Y., & Zainil, M. (2017). The instruments of higher order thinking skills. Journal of Physics: Conference Series, 943(1), Article 012053.

An Donghwy & Youn Nara. (2018). The inspirational power of arts on creativity. Journal of Business Research, 85, 467-475.
https://doi.org/10.1016/j.jbusres.2017.10.025.

Anderson, O. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. New York, NY: Longman.

Bezanilla, M. J., Fernández-Nogueira, D., Poblete, M., & Galindo-Domínguez, H. (2019). Methodologies for teaching-learning critical thinking in higher education: The teacher's view. Thinking Skills and Creativity, 33, 100584.
https://doi.org/10.1016/j.tsc.2019.100584.

Chacón-López, H., & Maeso-Broncano, A. (2023). Creative development, self-esteem and barriers to creativity in university students of education according to their participation in artistic activities. Thinking Skills and Creativity, 48, 101270.
https://doi.org/10.1016/j.tsc.2023.101270.

Chen Yi . (2023). The optimization path of art education in colleges and universities under the vision of aesthetic education.Art Education (01), 265-268.
https://doi.org/CNKI:SUN:YSJY.0.2023-01-061.

Cheng Lihua. (2022). On the Problems and Solution Countermeasures in Music Education in Colleges and Universities. Drama House (24), 184-186.
https://doi.org/CNKI:SUN:XJZT.0.2022-24-061.

Deng Shumei. (2022). Research on innovative teaching reform of basic music theory course in higher vocational colleges. Art Review (24), 129-133.
https://doi.org/CNKI:SUN:YSPN.0.2022-24-030.

Drew, C. (2023). 63 Higher-Order Thinking Skills Examples. Helpful Professor. Retrieved from https://helpfulprofessor.com/higher-order-thinking-skills-examples/

Fu, N., & Qi, M. (2022). Problems and Countermeasures of Continuing Art Education in Local Colleges and Universities in China. Education Teaching Forum, 31, 69-72.
https://doi.org/CNKI:SUN:JYJU.0.2022-31-018.

Gordon, S. J. G., Bolwell, C. F., Raney, J. L., & Zepke, N. (2022). Transforming a didactic lecture into a student-centered active learning exercise—teaching equine diarrhea to fourth-year veterinary students. Education Sciences, 12(2), 68.
https://doi.org/10.3390/educsci12020068.

Gu, X., & Lu, Y. (2023). Connotation and modeling of peer-to-peer classroom for promoting deep learning. Basic Education Curriculum, 13, 39-46.
https://doi.org/CNKI:SUN:JCJK.0.2023-13-006.

Hadi, S., Retnawati, H., Munadi, S., Apino, E., & Wulandari, N. F. (2018). The difficulties of high school students in solving higher-order thinking skills problems. Problems of Education in the 21st Century, 76(4), 520–532. https://doi.org/10.33225/pec/18.76.520

Hallam, J., Gallagher, L., & Owen, K. (2022). "I'm not the best at art": An exploration of children's growing sense of artistry within an outdoor, arts-based intervention. Thinking Skills and Creativity, 44, 101038.
https://doi.org/10.1016/j.tsc.2022.101038.

He, Z., & Xu, Y. (2015). Research on deep learning cultivation of college students. Journal of Hunan First Normal College, 6, 41-44.
http://doi:CNKI:SUN:DYHN.0.2015-06-012.

Heng, T. (2018). Coping strategies of international Chinese undergraduates in response to academic challenges in US colleges. Teachers College Record, 120(2), 1-42.

Hu Yiqing (2016). Exploring the problems and reform and development of design education in Chinese art education. Art Technology (12), 390.
http://doi:CNKI:SUN:YSKK.0.2016-12-350.

Huang, Y.-M., Silitonga, L. M., & Wu, T.-T. (2022). Applying a business simulation game in a flipped classroom to enhance engagement, learning achievement, and higher-order thinking skills. Computers & Education, 183, 104494.
https://doi.org/10.1016/j.compedu.2022.104494.

Jin, X., & Ye, Y. (2022). Impact of fine arts education on psychological well-being of higher education students through moderating role of creativity and self-efficacy. Frontiers in Psychology, 13, 957578.
https://doi.org/10.3389/fpsyg.2022.957578.

Krathwohl, D. (2002). A revision of Bloom's taxonomy: An overview. Theory into Practice, 41(4), 212-218.

Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools. Heliyon, 7(6), e07309. https://doi.org/10.1016/j.heliyon.2021.e07309.

Lewis, A., & Smith, D. (1993). Defining higher order thinking. Theory Into Practice, 32(3), 131-137.
https://doi.org/10.1080/00405849309543588

Liu, L., & Yang, N. (2018). Cultivation of college students' deep learning ability under the perspective of learning science. Journal of North China University of Water Conservancy and Hydropower (Social Science Edition).
https://doi.org/10.13790/j.cnki.issn1008-4444.2018.04.026.

Lu, K., Yang, H. H., Shi, Y., & Wang, X. (2021). Examining the key influencing factors on college students' higher-order thinking skills in the smart classroom environment. International Journal of Educational Technology in Higher Education, 18(1), 1-13.

López, J. M. T. (2016). Educación artística: Sustantivamente "Educación" Y adjetivamente "Artística"/arts education: Substantively "Education" And adjectively "Arts". Educación XX1, 19(2), 45-76.
doi:https://doi.org/10.5944/educXX1.14466.

Marzano, R. J., & Kendall, J. S. (2007). The new taxonomy of educational objectives. Thousand Oaks, CA: Corwin Press.

Megawati, Hartatiana, & Wardani, A. K. (2020). Title of the Article. Journal of Physics: Conference Series, 1480(1). https://doi.org/10.1088/1742-6596/1480/1/012050

Meng Lingkai. (2022). The "dissolution" of postmodern art from the origin of human art. Field (00), 172-183.
https://doi.org/CNKI:SUN:SDGM.0.2022-00-011.

Nisak, F., & Yulkifli, Y. (2020). Preliminary analysis of development electronic module using inquiry based learning model for 21st century. Journal of Physics:Conference Series, 1481(1), 012070.
https://doi.org/10.1088/1742-6596/1481/1/012070

Ozga, K., & Cudo, A. (2022). Exploring factors that differentiate art and non-art high school students. The Journal of Creative Behavior, 56(1), 6-15.
https://doi.org/10.1002/jocb.508

Pan Daoguang. (2019). Research on the Cultivation of College students' Innovative and Entrepreneurial Ability Based on Deep Learning. Journal of Hunan First Normal University.
https://doi.org/CNKI:SUN:DYHN.0.2019-01-016.

Paulsen, R. J., Alper, N., & Wassall, G. (2021). Arts majors as entrepreneurs and innovators. Small Business Economics, 57(4), 639–652.
https://doi.org/10.1007/s11187-020-00416-x

Retnawati, H., Djidu, H., Kartianom., EApino, E., & Anazifa, R. D. (2018). Teachers' knowledge about higher-order thinking skills and its learning strategy. Problems of Education in the 21st Century, 76(2), 215-230. Retrieved June 15, 2020 from http://oaji.net/articles/2017/457- 1524597598.pdf

Saido, G. M., Siraj, S., Nordin, A. B. B., & Al_Amedy, O. S. (2018). Higher order thinking skills among secondary school students in science learning. MOJES: Malays. Online J. Educ. Sci., 3(3), 13-20.

Song, Y., & Song, S. (2023). Problems faced by children's theater education and solution ideas. Oriental Dolls-Care and Education, 05, 33-34.
http://doi:CNKI:SUN:DFWW.0.2023-05-013.

Suparman, S., Juandi, D., & Tamur, M. (2021). Does problem-based learning enhance students' higher-order thinking skills in mathematics learning? A systematic review and meta-analysis. In Proceedings of the 4th International Conference on Big Data and Education, 2021 (pp. 44-51).
https://doi.org/10.1145/3451400.3451408

Tanujaya, B., Mumu, J., & Margono, G. (2017). The relationship between higher order thinking skills and academic performance of student in mathematics instruction. International Education Studies, 10(11), 78-85. doi:10.5539/ies.v10n11p78

Tseng, S. S. (2020). Using Concept Mapping Activities to Enhance Students' Critical Thinking Skills at a High School in Taiwan. Asia-Pacific Education Researcher, 29(4), 249–256. https://doi.org/10.1007/s40299-019-00474-0

Vazquez-Marin, P., Cuadrado, F., & Lopez-Cobo, I. (2022). Linking Character Strengths and Key Competencies in Education and the Arts: A Systematic Review. Educational Sciences, 12(3), 178. https://doi.org/10.3390/educsci12030178

Wang, L., & Jiang, N. (2022). Managing Students' Creativity in Music Education – The Mediating Role of Frustration Tolerance and Moderating Role of Emotion Regulation. Frontiers in Psychology, 13, Article 843531. https://doi.org/10.3389/fpsyg.2022.843531

Wen, S., & Sun, G. (2022). Value-added assessment: Promoting sustainable development of every student. Shanghai Educational Research, 2022(03), 70-75. https://doi.org/10.16194/j.cnki.31-1059/g4.2022.03.003.

Xu Baozhong. (2021). Research on the Modern Transformation and Development of Higher Art Education in China in the New Era. Art Work (05), 112-114. https://doi.org/CNKI:SUN:MYLM.0.2021-05-018.

Xu, L., & Pan, J. (2022). Exploration of Art Education Mode in Colleges and Universities Based on Cultural Confidence. Ethnic Music, 6, 109-112. https://doi.org/CNKI:SUN:YLGS.0.2022-06-059

Yao Yaqian. (2023). Analysis of Issues and Strategies in the Development of Higher Art Education in Universities. In Proceedings of the 6th Teaching Seminar of the Guangdong Teachers' Continuing Education Society (Vol. 4, pp. 192-196).

Zhan, Z., Shen, W., & Lin, W. (2022). Effect of product-based pedagogy on students' project management skills, learning achievement, creativity, and innovative thinking in a high-school artificial intelligence course. Frontiers in Psychology, 13, Article 849842. https://doi.org/10.3389/fpsyg.2022.849842.

Zhang, Y., & Zhao, J. (2018). Introduction to the problems and improvement path of art education in the context of cultural industry. Art Review, 17, 143-144. https://doi.org/CNKI:SUN:YSPN.0.2018-17-068.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and prospects. American Educational Research Journal, 45(1), 166-183.