



# Digitizing Intangible Cultural Heritage in China: A Pedagogical Model for Innovation and Entrepreneurship Among New Media Art Students

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**Abstract.** Applying digital technologies to preserve cultural heritage is hardly a new concept. In 1990s, with the launch of the Memory of the World project by UNESCO, scholars all over the world began to pay attention to the digital protection of cultural heritage, both tangible and intangible [1]. Through the Memory of the World research network that could be forged globally, UNESCO aims for concerted efforts in mediating, safeguarding, and even promoting cultural heritage by new means of information communicating technologies [2]. Nonetheless the efforts, although commendable, have been more focused on the digital documentation instead of promotion of cultural heritage. Concurrently, as China attaches great importance to “entrepreneurship and entrepreneurship” education, college students’ innovation and entrepreneurship education has become an important field of research in China. This study defines intangible cultural heritage, explains digitization of intangible cultural heritage, points out the limitations of the efforts on digital preservation, overviews entrepreneurship education for college students in China, and proposes a pedagogical model targeted at new media art in higher education which seeks to propagate the efforts to digitally preserve and promote intangible cultural heritage under the values of innovation and entrepreneurship.

**Keywords:** Innovation and entrepreneurship · Digital preservation · Intangible cultural heritage · New media art

## 1 Defining Intangible Cultural Heritage

Since the Second World War, UNESCO has supported a series of world heritage initiatives, starting with tangible heritage, both immovable and movable, and expanding to natural heritage, and most recently to intangible heritage [3]. Although there are three

separate heritage lists, there is increasing awareness of the arbitrariness of the categories and their interrelatedness. Tangible heritage is defined as ‘a monument, group of buildings or site of historical, aesthetic, archaeological, scientific, ethnological or anthropological value’ and includes such treasures as Angkor Wat, a vast temple complex surrounding the village of Siem Reap in Cambodia; Robbin Island in Cape Town, where Nelson Mandela was incarcerated for most of the 26 years of his imprisonment; Teotihuacan, the ancient pyramid city outside Mexico City; and the Wieliczka Salt Mine, not far from Cracow, which has been mined since the thirteenth century.

Natural heritage is defined as ‘outstanding physical, biological, and geological features; habitats of threatened plants or animal species and areas of value on scientific or aesthetic grounds or from the point of view of conservation’ and includes such sites as the Red Sea, Mount Kenya National Park, the Grand Canyon and, more recently, Brazil’s Central Amazon Conservation Complex [4]. Natural heritage initially referred to places with special characteristics, beauty, or some other value, but untouched by human presence, that is, as wilderness, but most places on the natural heritage list – and in the world – have been shaped or affected in some way by people, an understanding that has changed the way UNESCO thinks about natural heritage. At the same time, natural heritage, conceptualized in terms of ecology, environment, and a systemic approach to a living entity, provides a model for thinking about intangible heritage as a totality, rather than as an inventory, and for calculating the intangible value of a living system, be it natural or cultural.

Over several decades of trying to define intangible heritage, previously and sometimes still called folklore, there has been an important shift in the concept of intangible heritage to include not only the masterpieces, but also the masters. The earlier folklore model supported scholars and institutions to document and preserve a record of disappearing traditions. The most recent model seeks to sustain a living, if endangered, tradition by supporting the conditions necessary for cultural reproduction. This means according value to the ‘carriers’ and ‘transmitters’ of traditions, as well as to their habitus and habitat. Whereas like tangible heritage, intangible heritage is culture, like natural heritage, it is alive. The task, then, is to sustain the whole system as a living entity and not just to collect ‘intangible artefacts’.

UNESCO’s efforts to establish an instrument for the protection of what is now called intangible heritage dates from 1952. The focus on legal concepts, such as intellectual property, copyright, trademark and patent, as the basis for protecting what was then called folklore, failed. Folklore by definition is not the unique creation of an individual; it exists in versions and variants rather than in a single, original, and authoritative form; it is generally created in performance and transmitted orally, by custom or example, rather than in tangible form (writing, notating, drawing, photographs, recordings) [5].

During the 1980s, legal issues were distinguished from preservation measures and in 1989 the UNESCO General Conference adopted the Recommendation on the Safeguarding of Traditional Culture and Folklore [6]. Dated 16 May 2001, the Report on the Preliminary Study on the Advisability of Regulating Internationally, through a New Standard-setting Instrument, the Protection of Traditional Culture and Folklore significantly shifted the terms of the 1989 document. First, rather than emphasize the role of professional folklorists and folklore institutions to document and preserve the records of

endangered traditions, it focused on sustaining the traditions themselves by supporting the practitioners. This entailed a shift from artefacts (tales, songs, customs) to people (performers, artisans, healers), their knowledge and skills. Inspired by approaches to natural heritage as living systems and by the Japanese concept of Living National Treasure, which was given legal status in 1950, the 2001 document recognized the importance of enlarging the scope of intangible heritage and the measures to protect it. The continuity of intangible heritage would require attention not just to artefacts, but above all to persons, as well as to their entire habitus and habitat, understood as their life space and social world.

Accordingly, UNESCO defined intangible heritage as: All forms of traditional and popular or folk culture, i.e. collective works originating in a given community and based on tradition. These creations are transmitted orally or by gesture, and are modified over a period of time through a process of collective recreation. They include oral traditions, customs, languages, music, dance, rituals, festivities, traditional medicine and pharmacopoeia, the culinary arts and all kinds of special skills connected with the material aspects of culture, such as tools and the habitat [7].

And, at the March 2001 meeting in Turin, the definition further specified: Peoples' learned processes along with the knowledge, skills and creativity that inform and are developed by them, the products they create and the resources, spaces and other aspects of social and natural context necessary to their sustainability; these processes provide living communities with a sense of continuity with previous generations and are important to cultural identity, as well as to the safeguarding of cultural diversity and creativity of humanity [8].

This holistic and conceptual approach to the definition of intangible heritage is accompanied by a definition in the form of an inventory, a legacy of earlier efforts at defining oral tradition and folklore: The totality of tradition-based creations of a cultural community, expressed by a group or individuals and recognized as reflecting the expectations of a community in so far as they reflect its cultural and social identity; its standards and values are transmitted orally, by imitation or by other means. Its forms are, among others, language, literature, music, dance, games, mythology, rituals, customs, handicrafts, architecture and other arts [9].

With 30 cultural sites, 9 natural sites, and 4 mixed sites inscribed on the World Heritage List as of 2012, China is a treasure of cultural heritage [10]. In fact, the Chinese government has publicly announced the implemented measures to integrate intangible cultural heritage items into the modern life while developing the nation's economic and social well-being [11, 12]. The categories of intangible cultural heritage have been updated to 11 categories, including folklore, traditional music, dance, opera, sports, arts, crafts, medicine and diet. The efforts to sustain intangible cultural heritage have also been supported by academic research, given that China is one of the high-yield countries recognized for research on intangible cultural heritage [13]. Concurrent with its efforts to sustain intangible cultural heritage are the efforts to boost mass entrepreneurship and innovation under the 14th Five-Year Plan period 2021–2025 [14]. Higher education institutions were identified as the talent training epicentre to transform education for mass entrepreneurship and innovation.

## 2 Digitizing Intangible Cultural Heritage

Intangible cultural heritage is the most stable cultural DNA of a nation, as well as the symbolic symbol that distinguishes one nation from another [15]. With China's attention to intangible cultural heritage and the introduction of a series of policies, China's protection and inheritance of intangible cultural heritage has achieved fruitful results. With the rapid development of information technology and digital media technology, the dissemination of intangible cultural heritage must progress with the times. The interactive, convenient and immersive characteristics of digital media can provide more choices for the expression of intangible cultural heritage information. For example, digital technologies such as virtual reality and holographic projection are used to provide audiences with vivid scenes of intangible cultural heritage, so as to enhance their perception of the real intangible cultural heritage environment and enrich their sense of experience and immersion. Therefore, it is necessary to understand the new development direction of intangible cultural heritage communication from multiple aspects, such as digital communication mode, digital communication display and digital communication media. Only by integrating the communication of intangible cultural heritage into the new digital media communication system can the accurate communication of intangible cultural heritage be realized and be promoted.

### 2.1 Digital Communication Mode

As a kind of intangible cultural heritage existing as a living culture, its dissemination must reflect regionalism and immediacy, that is, the dissemination of intangible cultural heritage cannot be separated from the original natural environment, ecological environment and social environment, and can be synchronized with the live display of intangible cultural heritage. The biggest advantage of digital communication is that it can make full use of information technology and digital technology to change the one-way mode of point-to-point or point-to-point communication of oral communication, text communication, printing communication and even the earlier electronic communication into multi-to-many, multi-face communication and face-to-face communication. As a result, passive audience become active producers, users and consumers. At present, there is limited research on digital communication modes of intangible cultural heritage. The existing research in this area could be further understood through these four categories:

**Mass Media.** This digital communication mode can make full use of the influence of mass media such as traditional newspapers, radio and television, realize the transformation and upgrading of communication services with the help of the network platform, and contribute to the reform of the communication mode of intangible cultural heritage. For example, the integration of TV and Internet technology can realize the trend of networking, intelligence and large-screen dissemination of intangible cultural heritage, and meet the needs of the audience in the family living room.

**Digital Archives.** Digital archives as a digital communication mode refers to the digitization of intangible cultural heritage resources by the intangible cultural heritage protection unit, the construction of its thematic database, and the audience through the Internet

to promote the dissemination and circulation of intangible cultural heritage information. At present, the digital library and digital museum are the most typical examples of digital archives, such as America's first virtual library "American Memory", which combines the use of voice, text, images and video data to digitize America's intangible cultural heritage, and establish the corresponding database project for the audience to read online and download.

**Internet Dissemination.** The interactive advantages of the Internet are utilized to disseminate intangible cultural heritage activities in real time so that the audience can feel the live intangible cultural heritage in real time. Audiences can share their cognition of the cultural space of intangible cultural heritage. However, the internet as a digital communication mode lacks such a shared context and cultural background, which greatly reduces its communication effect.

**Immersive Media.** 3D technology, virtual reality and augmented reality technology have the potential to draw the audience into the scene and enable them to be immersed in the context of intangible cultural heritage through interaction. Some scholars believe that the immersive protection and communication of intangible cultural heritage will become the mainstream of online media [16]. At present, the digital communication modes of intangible cultural heritage mainly consist of mass media, digital archives and the Internet. The sophisticated requirements of technology and capital by the immersive media as a digital communication mode have resulted it in being only a supplement to the first three modes.

## 2.2 Digital Communication Display

The various types of intangible cultural heritage could be divided into 11 categories, including including folklore, traditional music, dance, opera, sports, arts, crafts, medicine and diet [17]. It needs to be pointed out that all these categories of intangible cultural heritage have diversified contents and diversified forms of expression. Hence, to ensure the effective digital dissemination of these categories of intangible cultural heritage, it is necessary to first understand and master the characteristics of the different categories, and adopt different display methods according to different conditions. Peng et al. (2006) proposed that digital display of intangible cultural heritage should be based on the representation and characteristics of different types of intangible cultural heritage, classify and store information through various digital technologies, and realize digital display by various new media technologies [16]. Huang et al. (2012) proposed that intangible cultural heritage has various types and complex contents, with corresponding display methods that can be divided into traditional information display type, mechanical control display type, interactive touch screen display type, sensor-based display type, virtual reality display type, etc. [18]. Shan (2012) believes that traditional performance is a highly integrated intangible cultural heritage culture integrating music, dynamics, stories and other audio-visual elements. It transcends regional boundaries through digital audio and video, completes standardization and restoration, and realizes cultural sharing [19].

According to the characteristics of intangible cultural heritage, the selection and collocation of different digital display methods can achieve the optimal allocation of communication resources and real digitalization transmission. At present, under the new technical support system, digital communication and display methods have become rich and diverse, instead of being limited to traditional graphic printing and screen display, as shown in Table 1. On the basis of traditional information display, digital communication of intangible cultural heritage is realized with the help of various technologies, such as logistics network, 4G mobile network and virtual reality.

**Table 1.** Digital communication display mode

display <sup>↻</sup>	Related technologies and advantages and disadvantages <sup>↻</sup>
<b>Traditional information form display<sup>↻</sup></b>	The intangible cultural Heritage resources such as text, picture, audio and video and 3D model are displayed item by item in the way of traditional text and text and screen display. This kind of presentation <sup>↻</sup> Low cost, low technical requirements. <sup>↻</sup>
<b>Mechanical control type display<sup>↻</sup></b>	Through the mechanical device to simulate the intangible cultural heritage activity process, combined with a variety of display equipment, to achieve the intangible cultural heritage information visualization. This kind of display has a strong sense of experience, but relatively high maintenance costs. <sup>↻</sup>
<b>Interactive touch screen display<sup>↻</sup></b>	Users browse intangible cultural heritage information through touch operation. Reasonable interaction can improve the efficiency of information acquisition and enhance users' sense of immersion. The development cost of this exhibition is low, and it is mostly used in museums and other public cultural service places. <sup>↻</sup>
<b>Sensor based new Media interaction mode<sup>↻</sup></b>	Through gyroscope, sound field, magnetic field and other sensor technology, in view of the user interaction feedback information, after processing computing technology to respond. In recent years, it has been widely used and the technology is relatively mature. <sup>↻</sup>
<b>Based on virtual reality Sensory experience mode<sup>↻</sup></b>	Through computer technology to generate realistic three-dimensional vision, hearing, touch, smell and other sensory world, restore intangible cultural heritage information of a strong sense of reality. This display method has high requirements on hardware and site. <sup>↻</sup>

### 2.3 Digital Communication Media

Rich and diversified digital media enable intangible cultural heritage to have more and richer forms of expression. This section will discuss four types of digital communication media which have been involved in digitizing intangible cultural heritage.

**The Internet.** This is one of the earliest and most popular traditional media in China. Jia et al. (2012) mentioned that digital intangible heritage resources can be presented through pictures, videos, music and other video forms by browsing online intangible heritage resources based on personal computer terminals [20], such as “China Intangible Heritage Network”, “Chinese Traditional Villages captured” and the website of the International Intangible Heritage Expo Park. In addition, Wang (2014) proposed that the application of VR virtual display technology enables intangible cultural heritage to be simulated on the computer network platform, thus greatly enhancing the audience’s sense of involvement and experience in the display media [21].

**Intelligent Devices.** Smart mobile products, such as smart watches and mobile phones, are subtly influencing the way of life and entertainment of human beings, and this kind of smart products also have a wider audience. The Palace Museum has launched a number of mobile apps that make it easy for the public to see the cultural relics in its collection. At the same time, more interactive experience is integrated into the application, which can improve the breadth and speed of the dissemination of intangible cultural heritage to a certain extent.

**Social Networks.** As the most popular and popular social tool in the Internet era, social network has the advantages of fast propagation and popularity, and has also become an important channel for the exhibition and dissemination of intangible cultural heritage. Multimodal features of social networks such as WeChat and QQ complement the original oral, paper, stage, image of traditional media. The strength of this digital communication media is that the audience who access intangible cultural heritage through social networks can choose the cultural information of intangible cultural heritage according to their needs, and re-organize and create it.

**Public Cultural Platform.** Museums, art galleries, cultural centers and other public cultural platforms do not only display intangible cultural heritage through traditional media, but also provide a good public platform for the dissemination and display of intangible cultural heritage through digital construction [22]. Taking museums as an example, digital display forms can be added to display exhibits and interactive devices such as holographic projection and 3D can enhance the sense of participation of audiences. At the same time, audiences will use internet devices to enable information transmission and sharing. For example, in The Dongba Cultural Non-body Examination Museum in Lijiang, Yunnan, virtual try-on of ethnic costumes can be realized through photo collection, and composite photos of “try-on” can be transmitted to the audience. The simple cultural interaction experience leaves the audience with a deeper impression on the local culture and effectively communicates the regional non-material culture.

#### 2.4 Limitations of Digitization of Intangible Cultural Heritage

At present, research on digitization of intangible cultural heritage needs to explore more theoretical developments and methodical improvements to ensure the continual transmission of the digital communication of intangible cultural heritage. For instance, there should be explorations of the integration of different types of media, implementation of all-media communication projects, and digital transmission between different media. We should look forward to research that involves deep integration of broadcasting and the construction of a media communication platform adapted to “Internet+” [23].

In addition, there is also the problem of narrow research perspectives. There are more studies at the micro-specific level, but less studies at the macro-global level and systematic multi-perspective analysis. Digital communication of intangible cultural heritage is not only a technical issue, but also a complex cultural issue which involves complex subjects. The existing digital communication mode is unable to show the vitality of intangible cultural heritage.

The digital dissemination of intangible cultural heritage should be carried out in a dynamic or active way, independent of material carriers and with its own characteristics in communication channels and modes. Digital communication must fully consider the characteristics of the live communication of intangible cultural heritage to make digital communication more effective. In the past, the simple communication mode of video or picture plus text explanation can no longer meet the requirements of the communication of intangible cultural heritage. At the same time, different categories of intangible cultural heritage should have different forms of digital communication. For example, the material carrier for folk literature which mainly relies on oral creation and transmission should be different from folk art and other intangible cultural heritage items. However, the existing communication mode is in the form of “one size fits all”, which lacks the diversity and diversification of communication mode.

In 2006, 2008, 2011, 2014 and 2021, The State Council published five batches of the list of state-level intangible cultural heritage projects, totaling 1,557 state-level representative intangible cultural heritage projects. In addition, each province, city, district (county) has corresponding representative intangible cultural heritage projects. As of 2021, Hubei province has a total of 352 representative intangible cultural heritage projects at the provincial level, and there are many representative intangible cultural heritage projects listed in the project list of all levels in China [17]. The digital transmission modes based on the mass media and digital libraries usually focus on big projects that hold the promise of extensive audiences and social recognition, such as the Spring Festival, Lantern Festival, Dragon Boat Festival, Mid-Autumn festival, the Peking Opera; and intangible items such as calligraphy and acupuncture. However, the proportion of representative intangible cultural heritage projects transmitted by mainstream media is very small, and most intangible cultural heritage projects are escaped the attention of mass media. However, it is precisely these intangible cultural heritage in a weak position, due to lack of social attention which are in danger of being lost or dying out. Internet communication mode can better promote the dissemination of intangible cultural heritage in disadvantaged status, but there are only few studies in this area.

Different contents of the communication of intangible cultural heritage determine that the corresponding media must be selected. In particular, with the development of big data, virtual reality, artificial intelligence and other emerging technologies, technology-driven communication has begun to leap from the mass media era to the intellectual media era. The intellectual media era does not only involve application of new technologies but will affect the entire communication ecology and pattern. At present, the research on the communication of intellectual media is in its infancy, with few research achievements. Therefore, devising strategies to capitalize on emerging technologies and their relationship with the media and applying the technologies of intellectual media to the communication of intangible cultural heritage will be a significant challenge to be overcome.

In recent years, although the film and television communication of intangible cultural heritage has developed rapidly, its themes are concentrated on myths and legends. Mythological novels such as *Journey to the West* and *Saga of The Gods* have several well-known characters who have attained the status of Image Intellectual Property such as Sun Wukong, Nezha and Jiang Ziya. Adaptation based on this theme can save a lot of



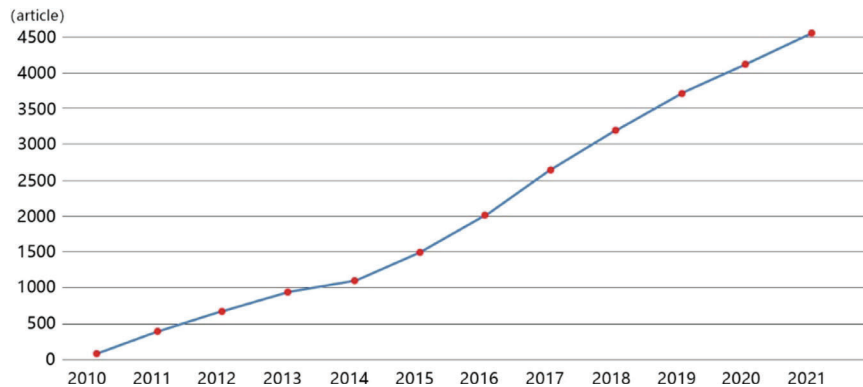
publicity costs and produce relatively small risks, so it has become the main source of topic selection of film and television animation for all ages. From Princess Iron Fan to Uproar in Heaven, and from Monkey King: Monkey King: Hero is Back to The Journey to the West, it is typical to reproduce homogenized cultural representations within the scope of traditional myths and legends. The negative implication would be the audience's aesthetic fatigue on the communication of intangible cultural heritage films and television. The issue of how to creatively integrate more diverse elements of Chinese intangible cultural heritage into film and television, so that the audience can appreciate the beauty of their intangible cultural heritage, hence requires attention.

### **3 Innovation and Entrepreneurship Education for College Students in China**

Innovation and entrepreneurship education is an important contributor to employability and skill enhancement of college students. This section explains the practical motivation and theoretical interests that resulted in the higher education institutions in China being the apex for innovation and entrepreneurship education.

The focus of China's national strategy has been on effectively improving China's progress in innovation and entrepreneurship work. As a result, colleges and universities carry out diversified entrepreneurship education, mainly in five forms: participating in "entrepreneurship and innovation" competition, constructing entrepreneurship parks or bases, opening makerspaces, establishing entrepreneurship colleges, and setting up entrepreneurship courses [24]. Thus, driven by the national policy of entrepreneurship and innovation, the original social concept of "entrepreneurship" has been endowed with more interdisciplinary connotations, presenting "entrepreneurship education" in the educational discourse system.

With China's attention to innovation and entrepreneurship, innovation and entrepreneurship has become an important driving force of China's economic development, and also become an important goal of college students' education and teaching. In research, entrepreneurship education and innovation education have become research hotspots. Based on different disciplines, researchers have carried out in-depth studies on the model, mechanism and implication of entrepreneurship education. For the model of entrepreneurship education, it is when entrepreneurship education has developed to a certain stage and accumulated certain experience that replicable and extendable experience and practices are condensed. This study identified 4582 relevant studies with the use of these words in search: "entrepreneurship education for college students". Furthermore, "entrepreneurship education for college students" was taken as the key word and "mode" was included in the index. The resulting amount of literature was 827 related studies, accounting for 18.05% of the literature on entrepreneurship education for college students (Fig. 1).



**Fig. 1.** Literature research trend of entrepreneurship education for college students (2010–2021)

## 4 Current Focus of Research on Entrepreneurship Education for College Students

The research on entrepreneurship education for college students involves various disciplines and education theory. The focus that could be inferred from the current research are school-enterprise cooperation, educational models, key components of entrepreneurship education, and dialectical approach to innovation and entrepreneurship.

### 4.1 School-Enterprise Cooperation

School-enterprise cooperation emphasizes the need to strengthen the cooperation between schools and enterprises in the development of entrepreneurship education for college students, and effectively enhance the entrepreneurial ability of college students through close school-enterprise cooperation and industry-university-research. This focus makes full use of the advantages of enterprises and makes up for the inherent deficiency of entrepreneurship education in schools. For example, Zhou believes that diversified cooperation can make full use of the support of enterprise policies and funds, and also resolve the disconnection between universities and enterprises [25]. At the same time, the university-enterprise cooperation could cultivate the entrepreneurial ability among college students through real experience of enterprise operation procedures and production procedures, work norms and technical processes, so as to enhance the entrepreneurial experience and ability of college students. For example, scholars Le and Lei proposed a “combat” innovation and entrepreneurship education model based on school-enterprise cooperation in view of the actual situation of students’ entrepreneurship in vocational colleges [26]. Thus, institutions of higher learning should no longer remain insular ivory towers, but need to strive for joint enterprise, linking classroom of entrepreneurship education with actual operations of enterprises, thereby prompting students promote entrepreneurship in the actual business dealings.

## 4.2 Education Models

Originally, the word “entrepreneurship” belongs to a typical sociological concept. Since the proposal of “entrepreneurship and entrepreneurship”, colleges and universities in China have carried out innovation and entrepreneurship education, in which entrepreneurship education is the ultimate purpose of innovation education, but also the most recent version of employment education in China. Therefore, Chinese colleges and universities put forward their own unique entrepreneurship education models that utilize and maximize their educational resources and niches of the colleges and universities involved. These institutions capitalize and re-design college entrepreneurship education programs for college students. For example, Liao et al. proposed the 3 + 1 entrepreneurship education model of higher vocational colleges [27], and Gao (2016) proposed the “one, two, three” model of entrepreneurship education for college students [28]. In addition, there is the “three planes” entrepreneurship education model [29]. These entrepreneurship education models rely on professional knowledge as an important basis, and integrate elements in the process of entrepreneurship education, with the aim to effectively improve the entrepreneurial ability of college students. For example, the “Trinity” entrepreneurship education model [30], the “four-in-one” entrepreneurship education model [31] and the “six-In-one” entrepreneurship education model [32].

## 4.3 Key Components of Entrepreneurship Education

Based on different disciplines and emphases, colleges and universities deconstruct the key components of entrepreneurship education while implementing it in their respective institutions. Some scholars believe that key components in entrepreneurship education could highlight the niche of the school to cultivate entrepreneurial talents [33]. For example, Xu and Zhang who studied entrepreneurship education for art and design majors put forward the “four holistic education” entrepreneurship education model of full staff, full process, full integration and full environment [34]. It can hence be inferred that entrepreneurship education is not accomplished overnight, but require careful focus on the process of education and teaching practice to improve the entrepreneurial ability of college students.

## 4.4 Dialectical Approach to Innovation and Entrepreneurship

The educational goals of innovation education and entrepreneurship education are different. In general, innovation education is an important part of entrepreneurship education which promotes college students’ employability. Nonetheless, ever since the “double gen” concept was proposed, innovative education and entrepreneurship education has become a pair of “twin brothers”, concurrently serving the roles of logic and purpose. Therefore, some colleges and universities integrate innovation education and entrepreneurship education into research and practice, besides forming personalized innovation and entrepreneurship education models. For example, Huazhong University of Science and Technology has put forward a new model of entrepreneurship and entrepreneurship education featuring “one body, two wings and three fulcrum”, which

provides a useful reference for universities to carry out innovation and entrepreneurship [35]. Hui et al. proposed the innovation and entrepreneurship education model based on entrepreneurial ecosystem theory [36]. Therefore, the current focus is on using a dialectical approach towards innovation and entrepreneurship in entrepreneurship education.

### 5 The 4321 Pedagogical Model as the Proposed Model

As educators in higher education institutions, the authors accept the challenge of transforming education to promote mass entrepreneurship and innovation while sustaining China’s wealth of intangible cultural heritage. Past studies contributed many innovative ideas on enterprising intangible cultural heritage, such as constructing an ‘experienescape’ [37] or developing a web platform [38]. Funded by a university-level grant which aims to develop talents in digitizing intangible cultural heritage, the first author intends to transform the pedagogical approach in the new media art studies of his university to nurture innovation and entrepreneurship among the students. In this paper, the authors would describe a pedagogical model named 4321 (Fig. 2) which would be explored in the design of teaching and learning of digitalization of intangible cultural heritage involving 50 degree students in new media art.

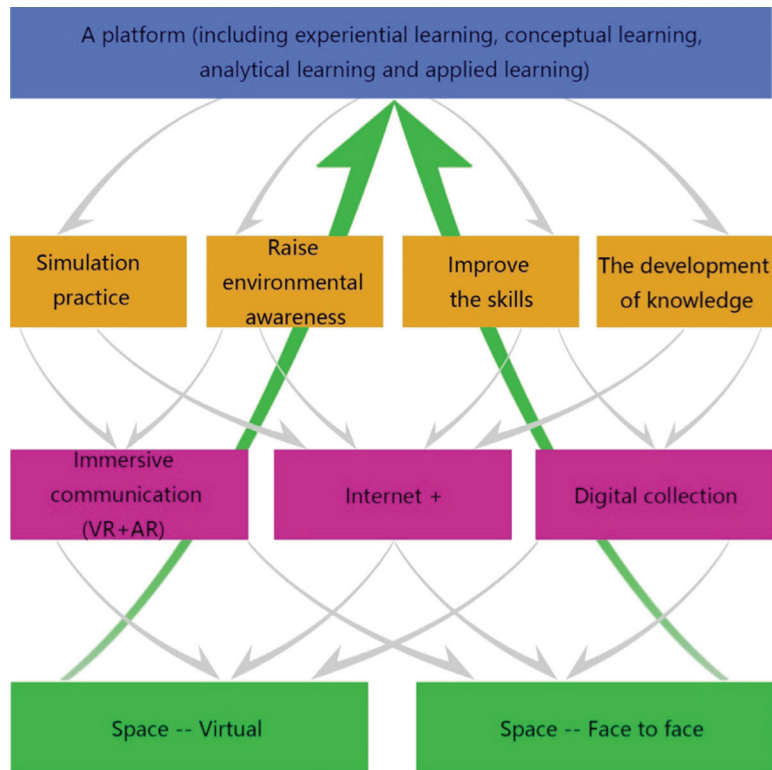


Fig. 2. The 4321 pedagogical model with knowledge application as the core focus

The 4321 pedagogical model involves three levels, four stages of learning and two spaces which would be integrated in one platform. The three levels of mastery are Digital Archive, Internet + and Immersive Communication (VR + AR). The four scaffolded stages of learning are development of knowledge, enhancement of skills, raising of environmental awareness and simulation of practice. All the teaching and learning activities would be carried out through two spaces – the face-to-face physical classroom and the virtual space. The single platform that integrates these levels of mastery, stages of learning and learning spaces would be the new media art course in the university. The theoretical framework of 4321 would be the Multiliteracies pedagogy which involve experiential learning, conceptual learning, analytical learning and applied learning [39, 40]. Four educational objectives were identified under the 4321 pedagogical model.

### **5.1 Re-conceptualize Educational Goals**

At present, the value orientation of innovation and entrepreneurship education in colleges and universities is too utilitarian, which is not conducive to the cultivation of advanced entrepreneurial talents and the construction of a positive and healthy atmosphere of innovation and entrepreneurship education. Therefore, the overall goal of innovation and entrepreneurship education should be re-conceptualized to stimulate students' innovation consciousness, forge entrepreneurship spirit, cultivate high-quality enterprises and develop the industry iteratively. Guided by the competence-oriented entrepreneurship education concept, innovation and entrepreneurship knowledge is divided into six levels: memory, understanding, analysis, synthesis, evaluation and application, so as to clarify students' learning objectives and establish an information-symmetric teaching contract relationship with them [41].

### **5.2 Align Teaching Content with Educational Objectives**

Innovation and entrepreneurship education in colleges and universities should re-select and design teaching content based on educational objectives, and transform the currently widely implemented curriculum-based innovation and entrepreneurship education into entrepreneurship education based on consciousness stimulation and ability cultivation. For example, innovation targeted at college students should cultivate thinking by setting up innovative thinking training courses for college students. The training should aim for team collaboration, organizational coordination, crisis management and other entrepreneurial skills. To aim at the skills of enterprise establishment and management, operation and management of entrepreneurial enterprises should be gradually changed to a more flexible content, with education ability training as the premise, and students can choose independently. Only in this way can we achieve the consistency of goals and the iterative upgrading of all links in the whole innovation and entrepreneurship education system.

### **5.3 Innovate Teaching Methods to Support Educational Objectives**

At present, innovation and entrepreneurship education in colleges and universities adopts various teaching methods and media, which are different in class and after class. However, with the gradual refinement of educational objectives, existing teaching methods

must be comprehensively innovated to support the realization of educational objectives [42]. Brainstorming, group debate, role play, and entrepreneurial teaching methods can continue, but should not be the only teaching methods. Innovation and entrepreneurship teachers need to constantly innovate teaching methods according to the change of entrepreneurship education goals. Some ideas and means of high-quality innovation and entrepreneurship education can be appropriately introduced. For example, students are required to set up online or offline micro-enterprises as a team, experience the management skills of enterprises in actual operation, and document enterprise operation in the course assessment, in order to change virtual operation into actual learning. Entrepreneurship mentors who are professional mentors should be arranged for students so that students can enjoy individualized guidance in innovation and entrepreneurship education.

#### 5.4 Implement Graded Assessment

Innovation and entrepreneurship education in colleges and universities must be based on its educational objective system and there should be comprehensive assessment indicators and standards for six levels of memory, understanding, analysis, synthesis, evaluation and application. A fuzzy assessment system will directly lead to the failure of the whole education system. The assessment system must be rigorous enough to evaluate if students can memorize entrepreneurial knowledge, accurately understand entrepreneurial theory, internalize entrepreneurial ability and use entrepreneurial skills to some extent. Innovation entrepreneurship education evaluation system should be implemented with quantitative measures which contain detailed descriptions of the six levels of mastery which are memory, understanding, analysis, synthesis, evaluation and creation.

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