EXPLORATION OF TOPCARES-CDIO CULTIVATION MODEL FOR DIGITAL ARTS TALENTS

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ABSTRACT

In order to solve the serious mismatching problem between the cultivation of digital arts talents and industrial requirements, this paper focuses on how to construct an application-oriented cultivation model for digital arts talent based on the TOPCARES-CDIO engineering educational approach. This paper first introduces the reason that digital arts education should be reformed in China, and then briefly describes what strategies have been adopted, how to effectively turn them into reality and what has been achieved during the process of TOPCARES-CDIO education reform of digital arts. Practical outcomes have shown that the proposed talent cultivation model can play a demonstrative role in current digital arts education.

KEYWORDS

TOPCARES-CDIO, Application-oriented Talents Cultivation Model, Digital arts

INTRODUCTION

Digital art is a general term for a range of artistic works and practices that uses in digital technology as an essential part of the creative and/or presentation process [1]. As an emerging art form, digital art has demonstrated unparalleled development potential since its birth. In recent years, the digital art industry has integrated with computer technology, communication technology, and entertainment industries in digital audio and video, digital animation, digital games, digital advertising, digital learning and digital publishing. It has been growing rapidly and exerting influence on people's daily lives, so digital arts related majors have been set up in many colleges. However, the rapid development of China’s digital art industry, to some extent, is limited by the lack of all-round application-oriented digital arts talents [2].

In order to conform to the trend of the digital era and cultivate application-oriented talents for the digital arts industry, this paper presents how to explore and implement educational reform of digital arts based on the TOPCARES-CDIO so as to build a systematically application-oriented cultivation model of digital arts talents particular to Neusoft [3~4]. In this paper, section 2 briefly introduces the background of the

educational reform. Section 3 describes what strategies have been adopted. Section 4 discusses how to implement the application-oriented talents cultivation model. Section 5 illustrates some achievements of the TOPCARES-CDIO digital arts reform. Section 6 concludes the paper and discusses future works.

WHY TO REFORM

Nowadays, digital art has unbelievable impact on people's daily lives, learning and working styles. As an emerging industry, it is rewriting the development history of this emerging industry of digital art. The huge business opportunities and prospects with the digital art industry have synchronously greatly promoted the development of digital arts education.

Currently, more than 1,200 universities in China have set up digital arts majors. However, in contrast to the apparent prosperity of digital arts education, "two booms two difficulties" problem exists in the digital arts talents markets. One boom is the rising of demand for talents and the other boom is the supply of graduates. However enterprise recruitment and graduates employment both face great difficulties.

1. A critical shortage of competent teachers [2]. Along with the growth of many digital arts majors, qualified faculty shortages have become more prominent increasingly. The majority of teachers are lack of specialized experiences. Additionally, a small number of teachers with engineering background qualifications are unable to teach well. As a result, it is not only hard to properly fill teaching positions but also to guarantee the quality of instruction.

2. Irrational mission statement, ambiguous objectives for talent cultivation, and unclear characteristics of each major [5]. Many universities didn't carefully investigate before they set up their digital arts programs and so the mission statement and the objectives of talent cultivation are ill-defined. Furthermore, some of them just followed the others blindly and did not take the operational conditions into consideration at all.

3. Outdated educational philosophy and lack of a scientific, systematic, and advanced curriculum. Many universities across the world have been analyzing and studying the essence and connotation of application-oriented talent as well as trying to design and develop their own models of application-oriented talents cultivation over the past decade[5~8].However, few of these models can be applied to the engineering education in the digital arts. Moreover, since teaching staff differs between universities and environments, most of the faculty members set up courses at their own will, which could easily lead to the unreasonable knowledge structure, slow updates teaching content, and a mismatch between industry and societal demands.

4. The lack of practice teaching environment. Currently, many universities are unable to provide enough engineering practice sites for the digital arts, so that a range of professional teaching can only be carried out by means of in-class lectures and training [5]. It is obviously no guarantee that students can achieve the intended learning outcomes.

5. A lower level of internationalization. The internationalization of digital arts education is the inevitable choice to fuel the digital art industry in China. However, there is a big gap between the curriculum in many universities and international requirements for digital arts talents. For example, international digital art talents are required to qualify with strong professional competence, interpersonal skills, and system design capabilities, but most of the existing curricula don't emphasize the development of these kinds of abilities.

To sum up, digital arts education in China is suffering from the pains caused by the insufficient resources and the rapid growth brought by extreme expansion of enrollment, so it's being faced with great pressure to reform.

WHAT STRATEGIES HAVE BEEN ADOPTED

Guiding Principles

After analyzing and identifying the stakeholders' requirements and combining them with the current situation in Chinese tertiary education and many years of practical experience in cultivating application-oriented talent, the TOPCARES-CDIO engineering educational approach has been creatively developed by Dalian Neusoft University of information (DNUI). Here TOPCARES is an acronym referring to eight first-level ability indices particular to Neusoft, i.e. Technical Knowledge and Reasoning, Open Thinking and Innovation, Personal and Professional Skills, Communication and Teamwork, Attitude and Manner, Responsibility, Ethical Values, as well as Social Contribution by Application Practice (CDIO). As for the suffix "-CDIO", it means that TOPCARES-CDIO is inherited from CDIO Initiatives [3~4]. TOPCARES-CDIO has put forward a series of practical solutions that can be used to effectively solve the mismatch between industry demands and educational output. In this case, TOPCARES-CDIO is regarded as the guiding ideology of education reform for the digital arts at DNUI.

Strategic Objectives

To facilitate the development of the education reform of the digital arts based on TOPCARES-CDIO, we should understand its strategic objectives clearly. The principal objective of education reform is to create an application-oriented cultivation model of the digital arts under the guidance of the TOPCARES-CDIO engineering

educational approach, which should provide a reasonable cultivation objective system, an effective faculty development plan, a good experimental teaching and learning environment, an advanced theory and practice teaching system, an efficient institutional management system, and a quality assurance system. It should also fulfill the needs of all stakeholders, including students, teachers, the industry, and society.

Construction Methods

Just as other goods and services, talents cultivation model can be constructed using the methods of product and system development and operation. For example, the process of adapting and implementing the CDIO Approach is closely aligned with the phases of the product, process, and system lifecycle [6]. Similarly, a modified construction method for an application-oriented talents cultivation model is proposed as illustrated in Figure 1.

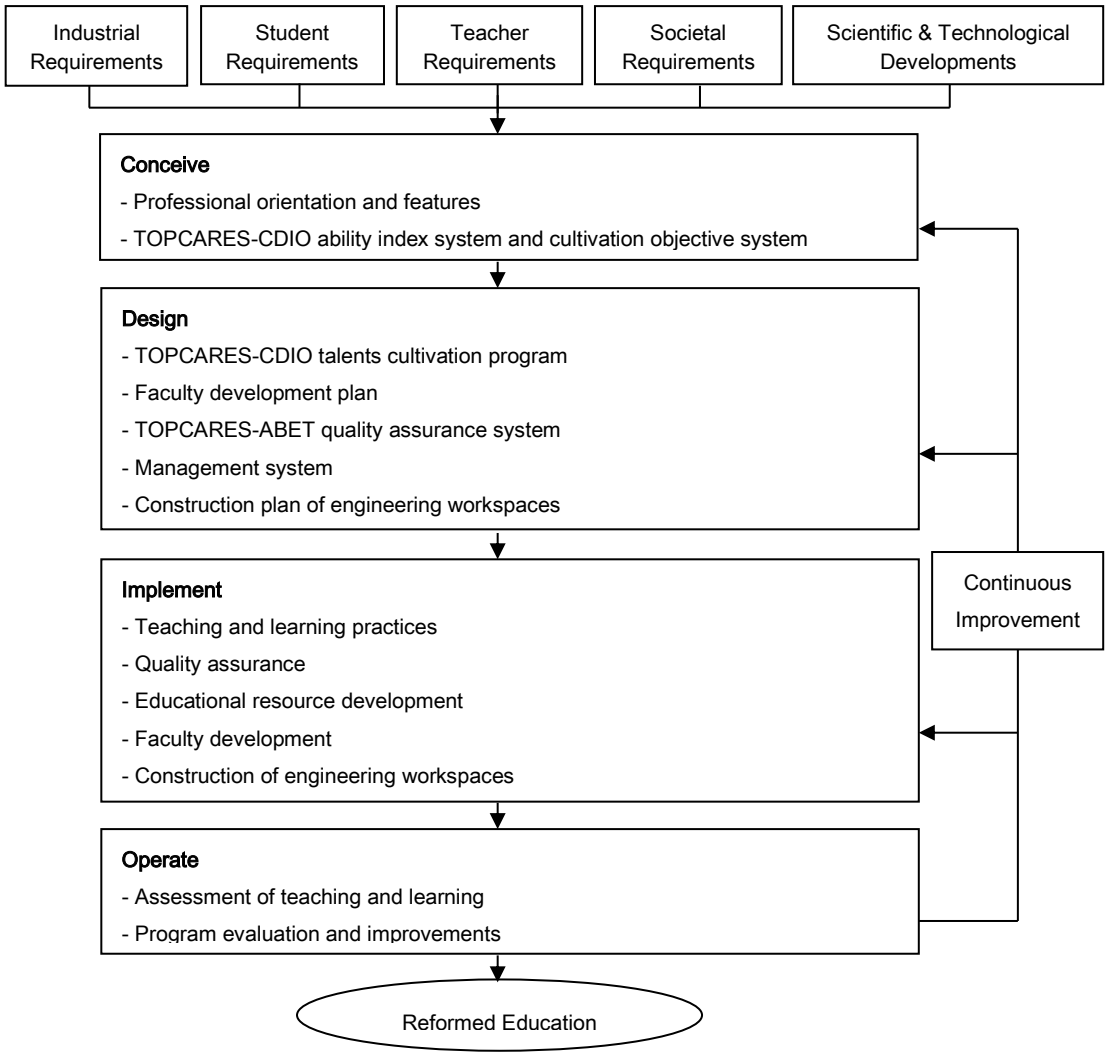

Figure1. Design and development of the TOPCARES-CDIO cultivation model

The proposed model is involved in all phases of Conceiving, Designing, Implementing, and Operating a talents cultivation model:

The Conceive phase usually needs to identify and analyze the stakeholders' requirements, define professional orientation and features clearly, set the TOPCARES-CDIO ability index system and cultivation objective system scientifically and reasonably; and figure out the educational resources required for the talents cultivation.

The Design phase involves creating all kinds of design schemes and plans, including the TOPCARES-CDIO talent cultivation program, faculty development plan, teaching and learning management plan, student management plan, quality assurance standards and guidelines, construction plan for engineering workspaces, educational resource development scheme, etc.. This phase clarifies the main activities of educational teaching reform such as course adjustment, workspaces, teaching and learning practices, learning assessment, and program evaluation.

In the generic Implement phase, the main activities include teaching and learning practice, teaching and learning quality assurance, educational resource development, faculty development, and the construction of engineering workspaces. It is supported by open-source ideas and resources of CDIO Initiative [4].

Finally, the generic Operation phase chiefly consists of the operation and evaluation of the program. Its output can be used to help understand and identify methods for continuously improving education quality.

The above four phases constitute a closed loop iterative process, in which continuous improvement of education quality is driven by the results of teaching and learning assessment, changes in required learning outcomes over time, and institutional changes.

HOW TO PRACTICE

A talent cultivation model generally refers to the whole system of strategies which are adopted by an educational institution and how its cultivation practices are organized and carried out. Now that the reform strategies have been defined, the next step is to figure out how to make them a reality. In order to make education reform of the digital arts more efficient and effective, the following practices have been put into place:

1. Reevaluating our conceptions, and carrying out and implementing TOPCARES-CDIO educational approach.

Compared with traditional art, digital art may not only eliminate the handmade era's ideological shackles, facilitate the integration of art and technology, make artistic expression richer, and create more incredible visual effects, but also greatly improve the efficiency of artistic creation. Therefore, we need to reform and modernize the

conception, curriculum system, teaching standards, facilities and methods of digital arts education.

2. Regularly carrying out extensive and in-depth investigations, identifying and analyzing the further demands of stakeholders.

TOPCARES-CDIO requires full consideration of the needs of students, teachers, schools, industries and society, and an accurate grasp of the development trends of science and technology [4]. In this case, we have designed a series of questionnaires according to the TOPCARES-CDIO ability index system: "Questionnaire for Freshmen", "Questionnaire for Graduates", "Questionnaire for Parents" and "Questionnaire for Enterprises". We regularly carry out extensive and in-depth investigations based on these questionnaires. Meanwhile, we also regularly carry out seminars and follow the tracks of digital art industry's and education's development trends.

3. Being committed to providing students with practical experience and constructing an integrated TOPCARES-CDIO talent cultivation program.

As the needs of stakeholders have been fully clarified, we can begin to define the objectives and specifications of talent cultivating, systematically building up a corresponding TOPCARES-CDIO ability index system and scientifically designing a corresponding talent cultivation program. Then we actively invite digital art enterprises to participate in the development of project-oriented courses, particularly capstone courses. Meanwhile, we integrate a series of project-oriented quality education activities into the TOPCARES-CDIO talent cultivation program in an orderly manner in order to improve students' professional abilities, teamwork skills and career prospects.

4. Enforcing faculty development practices, attracting and training teachers with practical engineering experience.

It's well known that teachers are the most important educational resource, qualified teachers particularly are one of the most significant contributing factors in improving the quality of teaching and learning and aiding the educational institution in accomplishing its objectives and missions. So we need to find ways and means to attract, recruit, develop, and retain qualified teachers. Therefore, we have created a multi-channel sustainable faculty development framework. We are meanwhile paying more attention to improving working conditions, increasing competitive salaries and funding, and providing more opportunities and support for faculty to enhance their own competence in engineering practices.

5. Improving the practical teaching and learning environments by creating adequate engineering workspaces and laboratories.

To ensure the efficient and orderly operation of application-oriented digital arts education reform, effectively integrate high-quality resources from both university and enterprises, further deepen and strengthen the substantive cooperation between the

university and enterprise, and maximize the teaching and learning impact of practical teaching, we establish a cluster of practice and training bases in line with the requirements of TOPCARES-CDIO engineering practice environment, which are divided into two groups. The first is the practice and training group on campus, which consists of a series of professional studios, laboratories, and virtual enterprises. The second is located in external enterprises by means of in-depth cooperation of production, education and research.

6. Using scientific quality assessment and assurance methods to improve teaching
TOPCARES-CDIO educational reform is a continuous improvement process. To this end, TOPCARES-CDIO has constructed an integrated TOPCARES-ABET quality management and assurance system [4]. We adhere to this system to monitor, evaluate and improve teaching and learning quality.

In addition, to promote the development of both higher education and scientific research, we have established an effective incentive mechanism to motivate teachers to pursue continuous self-improvement in technological innovation, product development and foreign language skills, as well as to participate in or undertake University-Enterprise cooperation projects. We are committed to seeking all kinds of cooperation opportunities with well-known enterprises in the digital content industry. We also encourage the appropriately skilled teachers to set up their own studios and virtual companies on campus in order to develop original digital content products.

WHAT'S BEEN ACHIEVED

After years of exploration and application of the TOPCARES-CDIO educational reform, the Digital Arts Department of DNUI has obtained the following remarkable achievements:

1. The TOPCARES-CDIO educational approach has taken root deeply, and the application-oriented cultivation model of digital arts talents has been put into effect fully, scientifically, normatively, healthily and efficiently.
Since September of 2008, we have applied the advanced TOPCARES-CDIO approach to the practical reform of digital arts education, and creatively designed and developed an application-oriented digital arts talent cultivation model. Currently, we have created five undergraduate majors: animation, film photography and production, digital media arts, visual communication design and digital media technology. The proposed talent cultivation model has been implemented in all majors. After four-years practice and innovation, we have designed many normative and available referable of documents, systems, forms, templates, examples and evaluation standards from all conceive, design, implement and operate stages of the talent cultivation model. For example, Figure 2 illustrates the experience of Conceive, Design, Implement and Operate a comic artwork in a comic design course. Moreover, we also won the first

prize in Teaching Achievement Award of Higher Education in Liaoning Province in 2012, which reflects the innovation, applicability and operability of this talent cultivation model.

Figure2.Comics Design Course: Conceive, Design, Implement and Operate

2. A provincial-level practical digital arts teaching base cluster of has been established for undergraduates, and the practical teaching environment has been greatly improved.

To fulfill the requirements of TOPCARES-CDIO's engineering practice, we have established a provincial-level practical digital arts teaching base cluster as illustrated in Figure3, which is composed of professional studios, professional laboratories, virtual companies and external companies. So far, we have set up 16 professional studios according to the real enterprise environment, including digital video, digital animation, digital games, digital painting, and so on. And we also built 14 professional labs, including sculpture, 2D animation, digital animation, stop-motion animation, digital printing, non-linear editing, photograph, etc., as well as 7 internal virtual enterprises and more than 20 external enterprises practice bases. The existing engineering practical context can fully satisfy the practice teaching needs of more than 1,800 undergraduate in the department.

Figure3.Digital arts practical teaching base cluster

3. Students' practical innovation abilities and employment competitiveness has been improved significantly.

By means of continuously enhancing our practical engineering environment, normalizing and optimizing project-oriented teaching operation mechanisms, we have built up and improved an integrated digital arts practical teaching system which is staged, hierarchical, gradual and progressive. It breaks the traditional teaching pattern so that students can choose any practical engineering environment in which they're interested and systematically experience the real working situations. After years of exploration and practice, the students' practical innovation abilities and employment competitiveness has improved significantly. The students from our department have won more than 100 awards at or above the provincial level in 2012, such as the 21th Times Young Creative Awards' Creative Resume Golden Award, the first prize in the National Colleges and Universities Computer Core Skills and Information Literacy Contest, and the third place in the Fourth National Advertising Art Design Competition for College Students. Moreover, graduates' initial employment rates in recent years have all been over 90 per cent.

4. Teachers' practical engineering abilities have largely improved.

In order to adapt to TOPCARES-CDIO project-based teaching, we assigned 12 backbone teachers to accept practical training in our cooperative enterprises, and employed 8 enterprise specialists with teaching abilities as full-time teacher as well as 12 enterprise specialists working as part-time teachers. And we have reformed the faculty evaluation system and take the practical skill as an assessment and evaluation index. Meanwhile, we have been reinforced the interaction and communication with enterprises, and strengthening the co-constructing and sharing of our teaching resources as well as actively providing technical services for the enterprises. All these measures have played active roles in effectively improving our teacher's practical engineering abilities.

5. An interactive display platform for teaching achievements has been established, and the social influence of our department has being improved substantially.

Through planning and building our teaching achievement website, our resource sharing FTP site and our digital art works multi-function exhibition hall, as well as hosting two professional contests and exhibitions: Digital Spring and Golden Autumn. We have opened up the exhibition channels of teaching achievements in all directions, and greatly improved our department's brand reputation. Nowadays, our department has already become one of the most important channels for DNUI to conduct the external exchange, achievements exhibition and image based publicity.

CONCLUSION

Under the guidance of the TOPCARES-CDIO engineering educational approach, the Neusoft specific application-oriented cultivation model of digital arts talent has been developed and applied to all majors at the Department of Digital Arts at DNUI. This model embodies Neusoft's high concern for its students' education. After several

years of exploration and practice, it has become more effective and practical. We have achieved remarkable results with certain promotional value. In the future, we plan to further study and practice normalized management, in depth cooperation between the university and enterprises, the best teaching and learning practices, and quality management and assurance so as to make cultivation model more suitable for studying and distribution.

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BIOGRAPHICAL INFORMATION

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