

# Exploration and Practice on Teaching of Immersive Lighting Technology Scene Teaching Based on TOPCARES-CDIO

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**Abstract**—The paper, based on the talents training mode of TOPCARES-CDIO integration, studies the application of immersive scene teaching in the course of lighting technique. Taking lighting technique course as the example, the application of immersive scene teaching in CDIO engineering education is discussed with assist of a series of methods, including literature research method, observational method, empirical research and experience summary. First of all, the educational concept of TOPCARES-CDIO integration talent cultivation is analyzed; secondly, the application of immersive scene in teaching is discussed; thirdly, with the combination of TOPCARES-CDIO educational concept and immersive scene teaching, the course system of video lighting technology is established; finally, the advantages and disadvantages of such teaching method during the practical application of the lighting technology course are analyzed.

On basis of the lighting technique course teaching under the guidance of TOPCARES-CDIO, immersive scene teaching, different from the two-dimensional teaching mode, enables students to acquire knowledge and master professional skills within the created three-dimensional practice environment. Students can bear a sense of presence and sense of interaction in the learning process, to stimulate their interest in learning with the form of immersive learning, explore professional skills with critical thinking, and strengthen their knowledge retention rate in three-dimensional practice mode, so as to obtain the professional knowledge and practical experience in an effective manner.

**Keywords**—TOPCARES-CDIO; immersion; scene teaching; lighting technique

## I. INTRODUCTION

Adhering to the CDIO engineering education concept, Dalian Neusoft University of Information combines the characteristics of Chinese localized education, and gradually explores a set of integrated talent training mode that meets the students' characteristics in the years of accumulated teaching reform practice, namely TOPCARES-CDIO. The film and television major is based on the TOPCARES-CDIO integrated talent training model. In the process of continuous exploration and improvement, the teaching reform is gradually carried out and makes fruitful achievements. Lighting technology, as the core curriculum of film and

television majors, is not only a bid farewell to traditional professional colleges focusing on book theory, but also different from the intra-industry's "master" with "apprentice" extensive lighting knowledge and technology learning mode. Under the guidance of TOPCARES-CDIO integrated talent training mode, this course uses the novel immersive scene teaching as the teaching environment to guide students to passively accept the conversion of active interest learning, improve students' knowledge retention rate, and make them grasp lighting technology and filming in practice exploration.

## II. TOPCARES-CDIO FILM AND TELEVISION INTEGRATED TALENT TRAINING MODE

TOPCARES-CDIO is the talent capacity training program proposed by Dalian Neusoft University of Information based on the results of international engineering education reform. It represents the students' ability in the learning process, namely T (Technical Knowledge and Reasoning), O (Open Minded and Innovation), P (Personal and Professional Skills), C (Communication and Teamwork), A (Attitude and Manner), R (Responsibility), E (Ethical Values), S (Social Value Created by Application Practice). The first letter of the system's primary capability indicator is "TOPCARES". In the course of many years of practice, the school has introduced cutting-edge science and technology, and built an integrated curriculum system with project-oriented teaching process and ability-oriented. With students as the center, it has solid foundation theory, consolidates practical ability, and guides innovative thinking to create student value.

Based on the TOPCARES-CDIO education implemented by Dalian Neusoft University of Information for many years, the film and television photography and production professional innovatively designed and implemented the construction reform method for social needs, innovated and developed the characteristics of film and television professional training, and strengthened the teaching of the basic course of film and television major. In 2013, the school won the college's excellent talent training program, and in 2013, it was awarded the Liaoning Provincial Comprehensive Reform Pilot Professional Construction Project, effectively improved the professional training facilities, and won 1 item of the second prize and the third

prize of the 2018 Dalian Neusoft Institute of Education Teaching Achievement Award, respectively. While the hardware equipment and professional teaching environment are perfect, the high-level faculty has become an important guarantee for the professional and curriculum construction. As of 2018, the number of associate professors in the film and television professional teaching faculty has reached 8 people. High-level professional teachers have also achieved remarkable results in the process of guiding students. Students have won 7 national-level projects and 11 provincial-level projects in the National Undergraduate Innovation and Entrepreneurship Training Program. In the competition, the students won one silver medal and one third prize in Liaoning Province, and won one gold medal in the 21st session of the Golden Award for creative resume design, two gold medals in the 8th International Design and Art Grand Prix, and more than 80 domestic academic other international competition awards, which effectively demonstrate the professional ability of students and reflect the teaching results of TOPCARES-CDIO film and television integrated talent training mode.

### III. IMMERSIVE TEACHING

The concept of “immersion” originated in the field of British drama and was called the Immersive Theatre. Compared with the passive viewing experience of traditional theater audiences, immersive theatre directly leads the audience from the auditorium into the drama, breaking the barriers, making them in the drama and becoming part of the drama, and giving the audience a strong sense of participation and interactivity, so it has made a boom at home and abroad.

The concept of “immersive” enters the field of education. It began in Quebec, Canada in learning French. It immerses primary and secondary school students in the language learning environment, which makes them have a strong sense of substitution, increase their interest in learning, and stimulate their ability to learn. Later, it was promoted in many countries and achieved good learning results. With the development of immersion, the concept of Immersive Learning is proposed, which is mainly used in the practice of language teaching. The main teaching mode puts students in a relatively closed environment, requiring students to be comprehensively and completely put into language learning to form language thinking and master the ability of language learning.

Therefore, whether it is immersive drama or immersive education, the concept of “immersion” combines viewers and students from traditional perspectives, teaching and acquisition, breaking boundaries, shaping scenes and making them immersive.

### IV. IMMERSIVE LIGHTING TECHNOLOGY SCENE TEACHING COURSE PRACTICE

#### A. *Lighting Technology Course Content Settings*

The “Lighting Technology” course is the core course of the film and television photography and production major of

Dalian Neusoft University of Information. It is also the basic course for training film and television professionals. It plays a vital role in the cultivation of professional students' lighting technology ability. This course, based on the professional ability of film and television, such as lens design and camera technology, through the study of the basic theory of lighting technology, combined with the case of lighting, students will master the relevant techniques of film and television lighting, is focused on the ideas and procedures of lighting, the basic props of lighting, the story film lighting method and the wax effect, guiding students to acquire knowledge and master professional skills in a three-dimensional practice environment, so that they have professional film and television lighting ability.

In the setting of the course content, the students are the main body of the classroom. The teachers use the guiding method to carry out the immersive scene teaching in the real-life studio, while guiding students to learn the basic principles of lighting technology and lighting methods, through the implementation of targeted lighting technology and the development of mobile terminals, to enhance students' flexible use of lighting technology in dynamic images. From the cognition and understanding of lighting, it can form the ideas of creativity, use lighting technology for shooting, and comprehensive apply software for post-production and other professional skills to simulate exercises, to participate in related competitions or virtual topic propositions. Through effective completion of the proposition, students will be able to meet the development of lighting technology, such as lighting creative thinking, scene lighting, creative lighting production and creative performance, and truly master and skillfully apply lighting technology in immersive scene teaching practice.

The course is divided into two chapters, one is the basic principle of lighting, and the other is an example of television and film lighting. First of all, it is the introduction of lighting technology courses and film and television industry, so that students have a preliminary understanding of this field, and then systematically learn lighting from theoretical content of the first division of lighting, three elements of lighting, Illumination method and mask method, excellent lighting goals, direct light and indirect light, light division, observation of light source, basic props for lighting, lighting ideas and procedures, and lighting order, thus establishing students' awareness of lighting and expanding students' thinking. Secondly, combined with the development of the media and business needs, from the studio lighting, light and shadow creative photography thinking and creative development, story film lighting and TV and film lighting examples, students can master the TV and film lighting methods and technology. Professional proposals can be made after mastering the lighting ideas and procedures in the previous stage, the light and shadow creative ideas were developed in groups, and further expansion and improvement were carried out. And the teachers set up a group to guide group by group on the light and shadow creativity, light and shadow performance, and preparations before the light and shadow shooting.

*B. Implementation of the Lighting Technology Course  
Under the Guidance of TOPCARES-CDIO*

Based on the TOPCARES-CDIO Bloom Learning Capabilities Pyramid, classroom and after-school teaching will be conducted in four stages, in the form of association and progressive, so that students can be immersed in the real work and practice environment of professional film and television studios, and achieve the purpose of entering into learning and participation. In this way, students will be able to train the professional film and television talents who have both lighting theory and lighting technology.

Lighting technology immersive scene teaching implementation teaching venue is mainly film and television professional studio, supplemented by the studio, the main equipment includes 5 computers, multimedia equipment, 5 Zeiss professional lenses, 19 Canon professional lenses, 4 sets of 5DIII Canon camera equipment, 4 professional film and television lamps, red headlights, portable LED K4000, film and television line KINO, professional fans and makeup equipment, etc.

Stage 1 is the immersion learning of the basic theory (see “Fig. 1”). The immersive real studio scene, rich professional lighting equipment and the actual generated film and television scenes are constructed to form an atmosphere that can attract students to learn. From the passive learning state of the past students to the active learning guided by the interest of learning, therefore, a solid theoretical foundation is formed in the first part of the theoretical study of lighting technology.



Fig. 1. Immersion learning of basic theory.

Stage 2 is the immersion learning of basic practice (see “Fig. 2”). In the form of group learning together, with clear practice methods, based on the practice scene as the core learning venue, offline exploration and sharing of the basic operations of lighting equipment among team members is the main method and form of teaching. In addition, the practice of internal and external scenes can be combined to experience and summarize the methods of use and gain practical experience to enhance the retention rate of knowledge.



Fig. 2. Immersion learning in basic practice.

Stage 3 is the immersion learning of the training program (see “Fig. 3”). This stage is to guide students to practice by method and proposition, consolidate the correct use of lighting equipment in a targeted practice, and gain more knowledge of lighting in practice. For example, the wax shadow light effect training program, students will feel the characteristics of light and shadow in the filming process, based on paper jams and other materials that can form a light-shielding effect, by controlling the intensity of the light and the change of the position of the light source.



Fig. 3. Immersion learning of training programs.

Stage 4 is an immersion study for innovative creation projects (see “Fig. 4”). This stage will combine the professional knowledge gained in this course to strengthen students' open thinking and innovation, personal professional ability, communication and teamwork, attitudes and habits, responsibility, values and comprehensive practical ability and creativity. It also tests the teaching results based on TOPCARES-CDIO immersive scene teaching in the mastery of lighting technology expertise. Students will use the lighting equipment to carry out creative image shooting with the proposition given by the collaborative enterprise, effectively presenting the creative theme, thus completing the learning and professional skills of the entire course.



Fig. 4. Immersion learning of innovative creation projects.

#### V. ADVANTAGES AND DISADVANTAGES OF IMMERSIVE SCENE TEACHING IN LIGHTING TECHNOLOGY COURSES

The advantages of immersive scene teaching in lighting technology courses are mainly concentrated in two aspects: one makes students have a strong sense of presence; the other increases the interactivity of the learning process.

On the one hand, the characteristics of lighting technology disciplines have strong practicality, requiring students to learn and master professional lighting and shading techniques, while immersive scene teaching sets up real professional film and television shooting scenes, professional lighting equipment and auxiliary equipment, to integrate students into the environment, substitute themselves into the learning environment, to make them to be immersive, and to have a strong sense of presence, effectively attracting interest in learning, gaining professional knowledge and mastering professional skills. On the other hand, when students are immersed in the scene, they can effectively promote the interaction between learners, the interactive experience of learners and professional equipment, and stimulate students' exploration and creativity in the environment, to achieve the practical effect of solving problems at any time and any place, to stimulate students' creativity, and to deliver professional talents with strong practical ability for the film and television industry, so as to create social value.

Strong sense of presence and interactivity also brings certain drawbacks. For example, students may be too immersed in real scenes and fail to follow the teacher's guidance to effectively complete the learning tasks, while the requirements of professional immersive scenes for venues and professional equipment are relatively high. In the hardware construction part of the school, it will spend a lot of manpower and resources to purchase and build related laboratories, and effectively implement the management.

#### VI. CONCLUSION

Based on the teaching of film and television lighting technology under the guidance of TOPCARES-CDIO, it is different from the flat teaching mode. The immersive scene teaching enables students to acquire knowledge and master

professional skills in the three-dimensional practice environment. With a staged teaching mode, students are encouraged to learn in an advanced way, so that it can enable students to have a sense of presence and interaction in the process of learning, stimulate students' interest in learning through the form of substitutional learning, explore professional skills with critical thinking, and strengthen their knowledge retention rate with a three-dimensional practice model, so as to effectively acquire experience of professional knowledge and practice.

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