Training of Game Specialty under the College-Enterprise Cooperation Mode

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Abstract. Local colleges should serve the local economy and industry in the process of talent training. This paper carried on a thorough research on the talent training mode of game specialty in the colleges, and proposed a series of reforms on the talent training of game specialty based on the college-enterprise cooperation mode. Through the college-enterprise cooperation, on the one hand, enterprises can choose adaptable graduates from colleges, so as to solve the talent shortage problem. On the other hand, colleges can understand enterprises’ talent requirements, so as to reform their talent training programs, curriculum system and practical teaching mode, etc. Moreover, through various forms of cooperation, colleges and enterprises jointly promote the entire game industry to convert from low-end manufacturing into high-end research and development industrial, finally promote the game industry to achieve comprehensive, coordinated and sustainable development.

Keywords: Talent training, Game specialty, College-enterprise cooperation mode.

Introduction
Talent training mode of game specialty in local colleges should meet the needs of game industry. Some abroad economically developed countries, such as the United States, France, Japan, South Korea, etc., the game industry is a very large industry, and its scale is bigger than the film, television and other entertainments [1]. Due to the huge industry scale, the training of professional game talents presents large-scale and normalization in these countries. Compared with above developed countries, China's game industry has only developed about thirty years, its scale is limited, and the talent training mode is still in an exploratory stage. Generally, the establishment of talent training system is lagging behind the development of corresponding industry, only when
the industry has developed to a certain degree, the talents requirement will increase, and the corresponding talent training system will be established. This is also the truth of China's game industry.

**The Status Survey**

After decades of development, the game industry has become the most promising new industry in China. As a kind of cultural industry, the game industry obtained the major support of China’s governments, and become a new economic growth point. The country encourage the domestic enterprises to create more game products with own intellectual property rights and compete with foreign enterprises, thus break the situation that the lifeblood of China's game industry are controlled by foreign countries.

In the Pearl River Delta region of Guangdong province, a plenty of game development enterprises are sprung up. In the research and development, manufacture and installation, theme project planning, engineering construction, etc., this region has formed a good industrial chain. The advantages of industrial clusters are increasingly apparent, and play a great leading role on the tourism, entertainment and other related industries [2]. In 2009, this region established the “National Game Recreational Industry Base”, this base is the world's largest and most influential game entertainment equipment manufacturing base and technology innovation center, the world's most influential game entertainment products and derivative products distribute trading center, national game product testing center and standard-setting center. It can be expected, by 2020, the gross production of the base will more than 18 billion RMB, actuating the annual output value of the derivative industry and other related industries more than 120 billion RMB. In order to adapt the industry development, the base need to introduce and cultivate more than 100 senior management experts, 1000 backbone management and development talents, 10,000 design and development technicists, expand employment opportunities more than 30,000. However, such a large talent requirements become a key factor and restrict the industrial development, and the existing college educational system is hard to meet the game enterprises’ requirements, thus leading to the disconnection of supply and demand. On the one hand, the rapidly grown game enterprises need plenty of professional talents, on the other hand, many college graduates still hovered outside the game industry and even can’t find a job. The colleges undertake the responsibility of cultivating talents for the industry. In order to meet the enterprises’ talent requirements, the colleges need to reform the traditional talent training programs and the obsolete curriculum system, by cooperating with game enterprises, the colleges can provide the enterprises’ needed talents.

Through a deep research on the talent training mode of game specialty in the domestic and international colleges, we realized that the talent training mode of game specialty in China is still in an exploratory stage, there still exist many problems, and summarized as follows:

First, the basis of game professional education is weak. As a new discipline, the game specialty emerged only a short time in the domestic colleges, the talent
training mode, curriculum system and practical teaching system, etc., have not formed a unified standard, this bring a negative impact on the whole game industry. At the same time, the current college educational system determines the deviation between the teachers’ evaluation criterion and the teachers’ actual needs. This kind of deviation causes the teachers who possess both theory and application innovation ability and rich experience in game creation are seldom. Especially in recent years, in order to perform teaching assessment, a lot of domestic colleges have to pay attention to the “senior” talent introduction, however, this kind of “senior” talent emphasizes the title and education, but ignores the actual engineering and industry background. In addition, the lack of professional laboratories also affected the quality of talent training. This kind of lack is not the scale of talent training is not large enough, but many colleges do not know the real enterprises’ requirements, so that the positioning of talent training is not accurate.

Second, the research level of game enterprises is relatively weak. For example, in the Pearl River Delta region, many game development enterprises have sprung up; however, these enterprises are mostly small or medium scale. Compared with high-tech enterprises, these enterprises are mostly labor-intensive enterprises. Because lack of soil to attract high-level talents, the enterprises that possess the independent innovation and development abilities are few, most enterprises only rely on the purchase the overseas game products to do further assembly production, earn low process fees. This situation is hard to promote a sustainable development for the whole industry. At this point, local colleges need to take on the responsibility of talent training, and strengthen the cooperation with the industry, and strive to improve the innovation and development abilities, accumulate research and development experience, and make our due contributions for the game industry.

Third, enterprises’ investment enthusiasm for research and development is not high. Game industry is essentially a blend of technology and entertainment. The ever-changing technologies create a variety of games and entertainment products. In turn, the peoples growing demand for entertainment also drive the higher levels of research and development. Therefore, in order to promote the game industry, we must adhere to the road of independent innovation. However, due to the lack of talents, resulting in most of the game enterprises’ innovation and research investment is seriously inadequate. Many small and medium enterprises do not want to invest more when considering the cost. At present, China's game industry is still not strong enough in the area of independent innovation capability, high technological and original products are relatively rare, the products’ additional value is not high, international cognition degree is not wide, talent training, product structure, management ideas, etc., still need to be further resolved.

In order to complement each other, local colleges and enterprises should cooperate in the talent training aspect, so as to change the deficiencies of both sides. Therefore, we conduct a deep study on the college-enterprise cooperation mode, and present a series of new cooperation modes and methods. These proposed cooperation modes have been inspected in practice and achieved the
desired results. Below we will give a detailed introduction about our adopted college-enterprise cooperation modes and corresponding teaching reforms.

**Reform of Curriculum System**

In the reform of curriculum system, we regard the comprehensive ability and professional quality as the basic principle, reorganize and integrate the scattered course contents, and form a new kind of teaching mode. In this new teaching mode, we intensify the characterized, new-style, and practical backbone courses, improve the operability of course knowledge, and run through the basic knowledge, professional theory, and practical operation in the whole professional curriculum architecture. In the meantime, we highlight the relationship between in-class teaching and extracurricular practice, and clearly point out that the talent training should closely integrated with the industry. In addition, we focus on solving the problems in the traditional teaching modes, such as the lack of connection between the basic courses and the professional courses, the lack of connection between the professional courses and the practice courses, the disjunction between the practice courses and the innovative projects, and the interruption and repetition between the course contents, etc. After tease the course contents and their cohesive relations, and combine with the enterprises’ different position requirements, we design a set of curriculum system, as shown in Table 1.

| Course Type               | Course Name                                                                 |
|---------------------------|------------------------------------------------------------------------------|
| Professional Basic Courses| linear algebra, C++ program design, data structure, etc.                     |
| Professional Direction Courses| game programming basis, computer graphics, 3D game programming, etc.      |
| Professional Elective Courses| digital graphic design, digital animation design, game engine programming, etc. |
| Practice Courses          | game scene modeling, game animation modeling, 2D game project training, 3D game project training, etc. |

The entire curriculum system presents the "easy to start, more practicality, more applications, and uninterrupted" characteristics, it weaken the discipline-based, emphasize the continuous, consistent, and cohesion of the curriculum, emphasize the cultivation of comprehensive quality, emphasize the importance of game design skills and game product development ability [3]. Through this curriculum system, we will strive to cultivate qualified talents in line with the enterprises’ needs, teaching the game development technology and platform that conform to the social mainstream, provide a practical teaching platform that accord with the enterprises’ demand.

**Reform of Practical Teaching**

The development of game products involves game planning, game design, game programming, game testing, and game publishing, etc. The objectives of
the practical teaching reform include three key issues: 1) how to be more reasonable to carry out the game development process, 2) how to teach students to master the necessary professional skills through practical teaching, and 3) how to effectively improve the efficiency of in-class teaching. Therefore, in order to cultivate the students' practical ability, we elaborately choose some complete game works as the teaching tasks and final targets.

First, we analyze the goal of each work step, establish the core tasks and relevant teaching topics. Through the practice of different teaching topics, students can give full play to the initiative of learning. According to the task needs, students can build the corresponding knowledge system, ability system, and change the passive learning situation.

Second, in the process of project guide, we fully exploit the correlation between various work steps, and grasp the production process on the whole. The teachers also play an important role in the whole project, they need to participate in the project selection, the decomposition of the work steps, the determination of the stage objectives, and the instruction of the practical details, etc. After completing the practical project, we also ask for the students to analyze the development ideas and conduct divergent thinking, thus can teach students to draw inferences about other cases from one instance. In the practical process, we adhere to the completion of the task as the goal, and strengthen the management of each practical step. We also encourage students to use a variety of methods, means, and technologies, and stimulate students to discuss enthusiasm. For example, in the course of "3D game project training", we choose a 3D Action Role-Playing Game (ARPG) as the carrier of the whole teaching content. According to the game development process, we divide the work content into three themes: environment configuration, game development, and game publishing. For the game development theme, as the core of the whole development process, we further subdivide into game plan, game design, game framework implementation, game UI implementation, and game logic [4]. In each process, we detailed enumerate the work tasks and related knowledge points, and construct the course system of "3D game project training" based on the working process, as shown in Table 2 [5].
Table 2. Course content of “3D game project training” based on the working process.

| Process       | Knowledge points                                      | Tasks and Goals                          |
|---------------|------------------------------------------------------|------------------------------------------|
| Game Plan     | game investigation                                   | game plan specification                  |
|               | game material collection                             |                                          |
|               | game planning                                        |                                          |
| Game Design   | game architecture design                             | game architecture design specification   |
|               | game interface design                                | game detailed design specification       |
|               | game play design                                     |                                          |
|               | game content design                                  |                                          |
| Game Framework| game framework programming                          | framework realization                   |
|               | game state machine                                   | game state control realization           |
|               | timer principle                                      | frame control realization                |
|               | multi-thread programming                             | multi-thread realization                 |
| Game UI       | game interface design                                | game resources loading                   |
|               | user interaction event handling                      | game resources display                   |
|               | game resources loading                               | game interface response                  |
|               | game special effect principle                        |                                          |
| Game Logical  | mathematics and physics                              | scene rendering                         |
|               | object-oriented programming                          | role and animation rendering            |
|               | interface programming                                | NPC control                             |
|               | collision detection                                  | AI realization                          |
|               | particle system                                      | collision detection realization          |
|               | scene rendering technique                            | particle effects realization             |
|               | scene rendering technique                            |                                          |

**Reform of Teaching Method**

In view of the characteristics of game specialty, we carried out the reform of teaching methods. First, by the use of constructivist teaching, information processing teaching, personalized teaching, cooperative teaching methods, etc., and the combination with traditional teaching methods, the teachers really become a "guide" of the students. Then, we fully respect each student’s personality characteristics and career development intention, and guide the students in group or individual mode. For example, in the course of “2D game development training”, we divide the students into different groups according to their programming abilities, and provide projects with different degree of difficulty. In each group, we assign the role to each group member, so that everyone can make the best use of, and avoid some students to depend on the other students. As a result, we not only take good care of the better students, but also mobilize the active participation of other students. These kind of flexible and scientific teaching methods are not only applied in the game professional practice courses, but also are used in the theory teaching as a transformed way. In this flexible and interesting form, the center of teaching has changed from teachers into students, and fully mobilizes the students’ learning interests. Though the reform of teaching methods, we broaden the students’ horizons, enhance the students’ communication ability, and cultivate the students’ career quality.
Reform of Score Evaluation

In our proposed talent training mode, we reform the score evaluation mode, and pay more attention on the learning process evaluation, because it is a more objective way to evaluate the students’ scores in the professional learning achievement. In order to check the effectiveness of students’ professional courses, we not only check the final test scores, but also conduct various forms of assessment in view of the teaching process, such as the degree of participation, the accomplishment of work, and the quality of submitted project, etc. The evaluators are also diverse, it can be students themselves, group members or teachers. The final score are combined with the process scores and final test scores, the final test score only occupy a percentage of the total score. The process scores are relatively high operability, and need to record by teachers in usual, though the human factors may be higher, this part score occupy an important position in the total score, otherwise it may result in high scores of low-energy students, that is only be good at the examination, but not good at practical design and programming, this type of students will be difficult to competent for a job when they are graduated from colleges.

The Construction of Practice Bases

Today, many college graduates are hovering outside the game enterprises and can’t find a job, the reason is that the colleges’ talent training direction is disjointed with the enterprises’ actual requirements. In order to allow the students to be able to adapt the enterprises’ needs after they are graduated, we have cooperated with many domestic game development enterprises, and establish various off-campus practice bases. Firstly, we joined the “China Game Amusement Association”, “China Software Industry Association-Game Software Branch”, and other industry associations. These industry associations give a full play to the role of intermediary services. Secondly, we established a series of college-enterprise cooperation platform and research centers with the regional game enterprises. With the help of enterprises funding and support, more teachers and students have opportunities to participate in scientific and technological innovation. At present, the number of well-functioning practice bases is above 30, they are distributed throughout the region. In the support of these practice bases, we transport plenty of graduates to enter into the relevant enterprises. Thirdly, through cooperating with well-known game enterprises, we jointly built the game industry common technology platform, and actively carried out industry-college-research cooperation. At the same time, we select the outstanding students to the enterprise internship, participate in cooperative projects, the enterprises have priority to retain these students when they are graduated, thus form a win-win situation. Last, relying on the game entertainment industry cluster in the Pearl River Delta region, we assigned a joint talent training agreement with the regional industrial bases, authorized the industrial bases to do practice training, thus provide students the opportunities for commercial project development, employment recommendation, self-employment encouragement and other services.
Through the establishment of various forms of practice bases, we integrated the talent training, employment recommendation, and game product development as a whole, so that students can gradually adapt to the industry during the period of undergraduate. At the same time, by cooperating with relevant enterprises, we built the game industry generic technology research and development platform and technology-based business incubator. Through the continuous improvement of innovation ability, we promote together the entire game industry from low-end manufacturing to high-end research and development, service and headquarters economy-oriented industrial, finally to achieve comprehensive, coordinated and sustainable development.

Conclusion
Game industry is a multi-industry integration, high-tech and cultural creativity industry, it is a sunrise industry. Compared with the general labor-intensive manufacturing industry, the game industry has high technological content and cultural content. Through the deep cooperation with enterprises, enterprises can choose outstanding graduates from the colleges, thus solve the talent shortage problem. In the meantime, colleges become a repository of talents, colleges can understand the enterprises’ talent requirements, so as to reform their talent training programs and construct scientific and effective curriculum system, improve students’ employment capacity. If things go on like this, we can promote the game industry in the health, sunshine, fashion cluster direction, and we can make the game industry really become an important driving force of regional economic development, finally we can make our game industry obtain a place in the international arena.

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