

# Research on Higher Education Management Curriculum Based on Digital Twin Technology

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**Abstract:** The innovative mode of practical teaching is a key link in achieving the cultivation of innovative "intelligent" talents in engineering. However, the specific application of artificial intelligence technology in the construction of innovative practical teaching has always been a challenge for the academic and industry sectors. Based on the perspective of school enterprise cooperation, with digital twin technology as the core, assisted by various artificial intelligence technologies such as augmented reality and synchronous modeling curriculum management in higher education institutions is an academic field that has just begun systematic research in China, and it is also a very promising field. This article reviews some research achievements in this field in Europe and America in recent years, and explores the concept, scope, significance, function, managers of curriculum management, as well as management in curriculum reform. The aim is to provide some ideas and references for future in-depth research in this field in China.

**Keywords:** Higher Education, Management Curriculum, Digital Twin

## 1. INTRODUCTION

In the context of Industry 4.0, intelligent manufacturing and smart factories are developing rapidly in the manufacturing field. Manufacturing enterprises urgently need to cultivate innovative and intelligent talents. However, how to cultivate innovative talents suitable for the "smart needs" of manufacturing enterprises, especially engineering innovative intelligent talents, has always been an urgent issue for universities and enterprises to explore and consider. In April 2018, the Ministry of Education issued the "Education Informatization 2.0 Action Plan", which clearly stated that the rapid development of artificial intelligence technology has put forward new requirements for the form of school education, emphasizing the need for schools at all levels to carry out the construction of intelligent teaching environments and promote the application of artificial intelligence in campus construction, education, and teaching.

In particular, the sudden COVID-19 in 2020 has brought unprecedented challenges to online teaching in China, which is mainly manifested in the following aspects: the quality of online teaching is uneven, students' online learning effect is unsatisfactory, and students' independent learning ability is uneven. The backwardness of teachers' information literacy and technology has become an important bottleneck restricting online teaching reform. In real teaching, online teaching is mostly only used as a supplement to offline teaching and has not been promoted and applied to form a teaching norm, which makes online teaching unable to avoid falling into the dilemma of "shallow learning".

The definition of the scope of curriculum management in foreign countries is also generally the same. For example, American scholar Stark defines curriculum management as the responsibility and authority exercised to ensure successful curriculum development, coordination, implementation, support, evaluation, and improvement. Management discipline is a science that arises from practice and is formed by numerous scholars and entrepreneurs based on summarizing the objective laws of management work. After long-term development, it has formed a complete set of theories based on summarizing and summarizing a large amount of practical experience. Management is another art that lacks significant

formulas or theorems. Experience accumulation plays an important role in management activities, and creativity based on different management scenarios further demonstrates this.

Therefore, management discipline is closely linked with practice. It is not only the management of materials, but also affected by soft factors such as society, culture, religion, and people themselves. These characteristics make management discipline significantly different from other disciplines. Through Data modeling and artificial intelligence algorithms, it monitors the changes and development of physical objects in virtual models, and complex processing, analysis and prediction of multi-dimensional data based on artificial intelligence, reasonably and effectively plan, and predict teaching decisions and processes.

Digital twins are the models that form a certain process in the physical world and their digital mirroring processes and methods in the digital world. They are also known as digital twins and include five driving factors: sensors, data, integration, analysis, and actuators in the physical world, as well as continuously updated digital twin applications. Currently, a new technology - digital twins - has emerged that can effectively achieve intelligent interconnection and interaction integration between the physical and information worlds. Digital twin is a tool to manage complex information by Data and information visualization, which can provide real-time, efficient, and intelligent service solutions for individuals, organizations and even systems.

## 2. THE PROPOSED METHODOLOGY

### 2.1 Characteristics of Quality Training for Management Students in Universities Based on Digital Twin Technology

The core feature of digital twin technology is "reflecting reality with virtuality, controlling reality with virtuality, and practicality with virtuality". From the perspective of curriculum organization and organization, higher education curriculum can be divided into three levels: the development of individual courses, the development of training plans, and the curriculum development based on colleges or schools. Course management mainly refers to the management of the

latter two levels. At these three levels, there are usually three groups of people responsible for curriculum management: teachers, managers, and leaders. For teachers, there are also differences in management responsibilities and powers at three levels. For example, some teachers assume the role of the person in charge of formulating training plans. So, teachers can usually be further divided into two categories, namely ordinary teachers and teachers who bear the main responsibility for formulating training plans (usually the department head or dean in charge of teaching work).

Most students majoring in management tend to pursue more specific management positions, therefore, possessing interdisciplinary literacy, especially basic knowledge in engineering, is essential for management students. Moreover, the combination of specific theory and practice, such as truthful research, case teaching, and other basic knowledge in other disciplines, can make it easier for students to integrate into situations and find the integration point of theory and practice, which can promote the teaching of management courses. With the support of digital twin technology, schools and enterprises collaborate to cultivate innovative and intelligent talents. Firstly, through visual platforms for practical operation drills, internal information such as equipment construction, machine design, production and processing processes, and mechanical control logic can be quickly transmitted to teachers and students more intuitively, improving the efficiency and quality of practical teaching.

Then, the school enterprise will further integrate, with university teachers, students, and enterprise professionals jointly participating in digital twin modeling and 3D design, interactive product design, and intelligent decision-making services. Finally, in response to the actual operational aspects of enterprise product design, production management, and process control, digital modeling, virtual simulation, online management, precise control, and decision support are used to optimize enterprise production performance, reduce system development costs, and improve production and operational efficiency. The fusion analysis technology of virtual and real teaching space refers to the construction of a corresponding twin teaching space in cyberspace through big data modeling, simulation, visualization, and other technologies, so as to realize the digitalization and virtualization of all elements of the teaching space, real-time and visualization of the whole state of the teaching space, that is, to build a digital virtual teaching space. There is a popular view in the academic community that the best course management is to manage as little as possible. And it is believed that the responsibility for course management should be fully delegated to professors, allowing them to develop courses or training plans based on their academic beliefs and interests.

## 2.2 The Application of Digital Twin Technology in Management Teaching in Universities

However, the practice of higher education both domestically and internationally has proven that such training programs are difficult to achieve success in achieving both the educational goals of the school and the goals of students themselves. The discipline of management is largely about managing people. With the process of world economic integration and the expansion of management scope, new requirements have been put forward for students in interpersonal communication and the reception of foreign cultures. In future life and work, these future managers will also have more opportunities for cross-cultural communication. The discipline of management knows

no borders, but management behavior is linked to cultural background and social atmosphere. During these internship tasks, students can immerse themselves in the design and management tasks of smart factories and workshops and participate in modeling and design based on digital twins under the guidance of teachers.

Different from the traditional design and management, students do not need to spend a lot of time on the processing of physical geometric modeling of factories and workshops, nor do they need to worry about their modeling, analysis and design not keeping up with the actual design rhythm of intelligent engineering, which is out of line with the actual product design, thus leading to the actual design problem of "two skins" of student modeling and factory design analysis. High speed data transmission part uses high bandwidth optical fiber technology real time transmission of limb and other data to teachers. At the same time, the data support layer breaks through traditional auditory and visual perception, utilizing technologies such as sensors and the Internet of Things to integrate multiple perceptual information. The digital twin podium is a real-time dynamic mapping of the real online teaching space; therefore, the real-time collection, transmission, and dynamic update of data are of great significance to it. Compared with Chinese universities, foreign universities have some differences in curriculum management due to different systems. Scholars abroad believe that the leadership of regular curriculum development and implementation can and should be undertaken by teachers, while the coordination work should be undertaken by management personnel.

Although these managers may have been, or still retain, the status of teachers. The evaluation work should be jointly undertaken by teachers and management personnel. The implementation of interactive teaching can take various methods such as student preview, classroom teacher questioning, classroom discussion, simulation games, and student speeches. This efficient classroom teaching method is not only beneficial for students to master the classroom teaching content, but also to stimulate their interest in learning, cultivate their self-learning ability, practical ability, problem-analysis, and problem-solving ability, develop their strengths, form their knowledge and skills, and cultivate their indomitable, united, collaborative, and innovative will and quality.

The "Double Studio" adheres to the educational philosophy of "emphasizing both knowledge and skills, and synchronizing theory and practice" in the process of talent cultivation. It is a collaborative education platform jointly built by both on campus training studios and off campus practice studios in the context of school enterprise cooperation and industry education integration. The task of teaching in the "double studio" is no longer solely undertaken by teachers. Engineers and professionals in enterprises will provide professional guidance to students and help them improve their information literacy and professional skills in practical teaching. The implementation of complex functions of the digital twin podium largely relies on an integrated computing platform, while the real-time integration of the online immersive teaching system.

## 3. CONCLUSION

Through school enterprise cooperation, digital twin technology enables college teachers and students and enterprise professionals to seamlessly connect their innovative ideas in real time, further deepen the digital transformation of

colleges and enterprises, and realize the innovative digital drive of colleges and enterprises based on the integration of virtual and real. Digital twin technology achieves deep intelligent integration of intelligent manufacturing in multiple fields through the integration of schools and enterprises, allowing practical teaching in universities and production practices in enterprises to shine with wisdom and innovation. At present, research in this field in China has just started. With the deepening of reform, research in this field will become increasingly urgent. Here, the author has only made some sporadic discussions in this field based on some recent literature, hoping to play a role in attracting valuable insights.

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