



MOOC Online Open Course “Construction of Operation Management” Under the Background of the Metauniverse

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Abstract. This paper studies the construction scheme of “Operation Management” MOOC, and constructs the teaching effect model of MOOC online open teaching in the course of “Operation Management”. Build a five-level technical structure model of the “Operations Management” MOOC in the context of the meta-universe. First of all, from the advantages of “Operation Management” MOOC construction, analysis of “Operation Management” curriculum objectives. The MOOC course of “Operation Management” includes 35 short videos. The number of videos for each topic is 2–3. The total duration shall not be less than 480 min. The duration of each short video is 10 to 15 min. Secondly, analysis of “Operation Management” MOOC construction implementation program. Specifically, the first is the design of curriculum content and analyse the concept of the meta-universe and its technical framework. Second, the design of learning activities and learning evaluation. Third, the design idea and effect of MOOC practice teaching activity of “Operation Management” course are put forward. Fourth, it studies the MOOC teaching method and means of “Operation Management”. Thirdly, it explains the teaching reform measures such as homework, examination and so on. Finally, this paper also analyses the data of students’ identification with the practical teaching method of “Operation Management” and the teaching method of “Operation Management”. Construct the teaching effect model of “Operation Management” MOOC course, and also construct the meta-universe “Operation Management” MOOC five-tier technical structure model. The results show that the design of knowledge points in MOOC teaching content is reasonable, the quality of micro-video recording, the title of MOOC teaching teacher, the age of MOOC teaching teacher, the gender of MOOC teaching teacher and the frequency of class discussion all affect the teaching effect of “Operation Management” MOOC course. The “Operation Management” MOOC practice teaching method ranked first in “Company Visit”. The most popular MOOC teaching methods were “case method”, “teacher teaching” and “role playing”. The application of meta-universe in MOOC teaching has broad prospects.

Keywords: Metauniverse · MOOC · Operation management · Teaching effect model · Construction implementation plan

1 Introduction

The advent of the information age has led to the spread of MOOCs around the world. MOOC is a reform of the traditional teaching mode, which has great potential and wide social influence, and has aroused great repercussions in domestic universities.

In 2001, Production and Operation Management was prescribed as a compulsory course for undergraduates majoring in business administration. Back in 1980, the title of this course was production Organization of Machinery Industry Enterprises, and “operations management” was also called “production and operations management”. It is a course developed from production management and Production Operation Management. For many years, at the undergraduate level, this course is a compulsory course for students majoring in business administration and marketing, as well as a major trunk course.

In the traditional “operation management” class, teachers adopt the form of “one-size-fits-all” in the teaching process and provide unified teaching guidance in accordance with the same standard. However, the reality is that each student has a great difference in learning basis and learning ability, as well as the ability to accept knowledge. Students’ learning of “operation management” knowledge increasingly reflects their personalized needs. In this context, the traditional teaching form of “operation management” has been unable to meet the requirements, and the teaching method must be reformed to meet the diversified needs of students for course learning.

MOOC is an emerging model of online course development. It develops from the new course development model of publishing resources, learning management system and integration of learning management system with more open network resources in the past. “Operation management” MOOC is not based on the credit system, but focuses on the growth and development of students, and provides students with free online learning services. Learners can combine their actual learning needs, which is of great importance [1].

With the rapid development of new technologies such as artificial intelligence, Internet of Things, 5G, blockchain, digital twins, cloud computing, block chain, etc., the era of the “meta universe” has arrived. 2021 is also considered the “first year of the universe” [2]. The emergence of the metauniverse has realised the expansion of living space, sensory experience, perspective dimension, ideological practice, etc. The metauniverse involves all areas of human society and requires the integration of multidisciplinary knowledge [3]. With the advent of the metauniverse era, the metauniverse has brought a new era of education and teaching reform.

The arrival of the era of educational metauniverse has brought innovation in teaching mode to the past “operation management” MOOC teaching.

2 The Centrality of “Operations Management” and the Merits of Conducting MOOC Construction

2.1 The Core Position of “Operation Management”

According to modern management theory, business management is divided into functions, of which the most basic and important functions are financial accounting, production and operations, and marketing. These three functions are both independent and

interdependent. It is through this interdependence and cooperation that the business objectives of the company can be achieved.

Due to the core position of “operation management”, this course has made great contributions to the cultivation of management talents and the development of management science and engineering and business management. First of all, Operations Management is a highly theoretical and practical course. In order to teach this course well, teachers must integrate into scientific research, do a lot of scientific research and enterprise practice work, and greatly improve the scientific research and teaching level of teachers in this course. Second, while completing the scientific research project, it will further enrich the content of this course. Teachers will use the cases written in the research work for classroom teaching, so that students will deepen their understanding of this course. Third, to cultivate a large number of teachers. With the expansion of the teaching scale, courses such as “Quality Management” will be derived from this course, or other professional courses will be newly opened by the teachers of this course. The teachers of these courses are required to be involved in teaching or guiding “Production Operation Management”. The teachers use “Production Operation Management” as a platform, and then creatively develop other relevant courses, and finally make it “Production Operation Management” as the core, but it is also a big curriculum system that depends on each other [4].

2.2 Advantages of “Operation Management” MOOC Construction

First, students’ learning time and space are not limited. Students can choose to learn independently, and can repeat listening to concepts and theories that are difficult to understand.

Second, the “operation management” teacher will pay more attention to explaining the connotation of the relevant concepts and principles of the “operation management” course from the effect of students’ listening to the course, and show it in a diversified way through MOOC.

Third, the “operation management” curriculum resources can be shared, and students from all over the country can learn comprehensively and lifelong, no matter where they are. Compared with traditional courses, “operation management” MOOC is a behaviour that students learn completely according to their own interests. “Operation management is a way to blur the line between formal learning and informal learning, and provide lifelong learning for learners [5].

Fourth, “operation management” MOOC makes the interaction between teachers and students more convenient. MOOC is rich in teaching resources, convenient for students to comment and evaluate, and timely feedback on the effect of listening. Through PPT, pictures and voice interpretation, synchronisation can be achieved. Through “hands up”, “sign in” and “answer cards”, it is more convenient for teachers and students to interact [6].

3 The Concept of Metauniverse and the Technical Framework of Metauniverse

3.1 Metacosmic Concept

There are three main explanations for the connotation of the Metauniverse. First, the Metauniverse is the landing site for the next generation of the Internet. The Internet is currently evolving into Web 3.0. In the context of Web 3.0, we pay more attention to people and tend to protect personal privacy. Second, the metauniverse is a reconstruction of human life in the three-dimensional digital world, which can reconstruct the trajectory of human social activities in the digital world. Third, the meta-universe is a virtual symbiosis of the physical world and the mathematical world.

The “meta-universe” is a constantly developing and evolving concept, and its connotation needs to be constantly enriched. This paper believes that the metauniverse is a digital living space based on AI, IOT, XR, digital twins, block chain, brain-machine control and other new technologies, which integrates the real world and the virtual world, and participates in the activities of the digital society through the ternary integration of natural people, intelligent robots and virtual digital people, and is formed by digital twins, virtual currency, virtual original, virtual symbiosis, and virtual and real interaction. The technological core of the meta-universe is integration and application.

3.2 Metacosmic Technical Framework

Metacosmic technologies include 5G, 6G, cloud computing, edge computing, Internet of Things, holographic projection, digital twins, blockchain, VR/AR/MR/XR and other technologies. Leverage the 5G and 6G ring network environment to build a new generation of Internet “operation management” MOOC application ecosystem. The 5G/6G network environment can guarantee the smoothness and low latency of the operation of the virtual learning scene in the “operation management” MOOC meta-universe, so that VR/AR/MR/XR imaging or holographic imaging technology can meet the low latency requirements, break the network speed limit and expand the boundaries of learning content. Yuan Ning Zhou integrated cloud computing, ubiquitous computing, edge computing and artificial intelligence, constructed and formed a new field of intelligent technology connectivity, and deeply promoted the mutual integration of “information physical society”. The virtual and real interface of learning Yuanning based on VR/AR/MR/XR visual immersion technology has become the access point of learning Yuanning[7]. The Internet of Things technology realises the technological form of ubiquitous connection and intelligent perception between people and things and among things. With the help of artificial intelligence and other technologies, Learning Yuanningzhou will realize personalized learning resource recommendation, learning behaviour data mining, knowledge atlas, multimodal emotional computing and other functions, so that teachers and students in Learning Yuanningzhou and their virtual avatars have social interaction, collaborative participation and adaptive learning and other functions. The learning universe based on VR/AR/MR/XR and digital twins can realise the “symbiosis and fusion” of virtual world and real world, and build an immersive learning experience of “strong

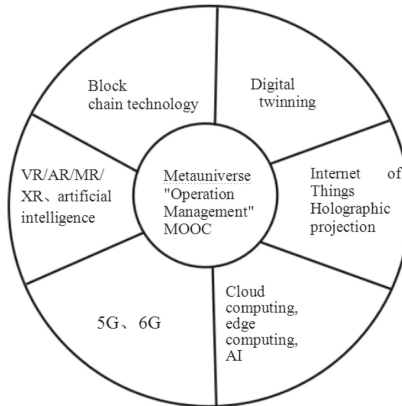


Fig. 1. Technical framework of metauniverse

presence” [8]. Blockchain technology also supports the confidentiality and traceability of the underlying data, as well as guaranteeing the safety of teachers and students studying in Yuanning (Fig. 1).

4 MOOC Course Objectives of “Operation Management” Course

The construction goal of “operation management” of large-scale online open course (MOOC) is: first, through the construction of a cloud-based open MOOC course education platform based on Internet technology and application, realize high-quality education resource sharing of “operation management” of high-quality resource courses, improve resource utilization efficiency, innovate education and teaching mode, promote teaching method reform, promote cultural exchange and cooperation, and expand the social influence of colleges and universities, enhance the social awareness of excellent teachers. Expand the radiation effect of “operation management” by using “Famous Teacher Studio”. Second, take the “operation management” MOOC course as the carrier, make full use of the advantages of information technology, explore a new mode of information teaching that combines online and open online teaching with classroom teaching, take the course to a new level of in-depth exploration, discussion, interaction and practice, and constantly improve the teaching quality of the course. Finally, through the study of this course, students can have a better understanding of the objective laws of the operation process of manufacturing and service industries, and have a better understanding of the concepts, methods and means of improving the management efficiency and enhancing the competitiveness of enterprises through operations management. Master the basic principles and methods of production and operation management, cultivate students’ ability to solve practical problems, and be competent in enterprise operation management [9].

5 MOOC Construction and Implementation Plan of “Operation Management” Course

The massive open online course (MOOC) demonstration project requires the “operation management” course to be built according to the characteristics of MOOC courses, while the “operation management” MOOC is a fragmented interactive learning course, which requires short and modular video content, organising knowledge points according to problems, and teaching based on knowledge points. The construction of “operation management” MOOC courses is to reform the existing course teaching design, unit content, knowledge structure, course resources, evaluation system and so on to conform to the network teaching habit.

The construction of “Operation Management” MOOCs into fragmented interactive learning courses requires short and modular video content, knowledge points organised by problems, and teaching based on knowledge points. MOOC course construction is to reform the existing course teaching design, unit content, knowledge structure, course resources, evaluation system and so on to conform to the network teaching habit. It involves the following four aspects:

5.1 “Operation Management” MOOC Course Content Design

The content of “Operation Management” course includes: learning objectives, teaching courseware, teaching videos, exercises and other parts. It is mainly published in the form of QQ space log, and diversified tools and functions in the space log are used to realise the presentation, enrichment and creation of the course content. Through the log reply, comment and other functions, learners’ views can be transformed into new ones. Learning content to continuously enrich and innovate the course content.

The resource part of the Operations Management course includes teaching cases, material resources, extension resources and other resources. All teachers and learners are course builders and participants, and can share course-related resources through the attachment upload function. Meanwhile, teachers and students are free to upload video, audio, images, hyperlinks and other resources to further enrich and expand the sources and forms of learning resources. The QQ space subscription function can push the latest learning resources and course content to learners, remind and invite learners to participate in learning; by using the QQ e-mail subscription function, learners can subscribe to the learning content they are interested in, realise personalised information aggregation and build their own learning environment. In addition, with the help of QQ, QQ Group, QQ Forums, QQ Mail, Tencent Micro Cloud and other functions and tools, learners can share high-quality network education resources, to realize the interconnection of information resources [10]. The micro-class design of “operation management” is shown in Table 1.

5.2 MOOC Learning Activity Design of “Operation Management” Course

The independent learning activities of the Operations Management course are realised by using the personal learning environment created by QQ space. Learners construct knowledge and personal opinions related to the course content, and establish and form

Table 1. “Operation management” micro-class

Special topic	Special subject	Proposed design and development methods and means
Topic1	The meaning of production operation management and the position of operation management in enterprise management	The learning modules in each chapter of operation management mainly include short videos and unit tests. The short video is a courseware recorded in sections according to the knowledge content of each chapter. The MOOC course of Operation Management includes 35 short videos. The number of videos for each topic is 2–3. The total duration shall not be less than 480 min. The duration of each short video is 10 to 15 min
Topic2	Tasks and principles of production operation management and characteristics of modern production management	
Topic3	New thinking of modern production management	
Topic4	Spatial organization of production process	
Topic5	Time organization concept of production process	
Topic6	Research and development of enterprises	
Topic7	Application of value engineering in research and development	
Topic8	Content and preparation procedure of production operation plan	
Topic9	The index system of production and operation plan, and the calculation of production and operation capacity	
Topic10	Production operation plan	
Topic11	Supply chain management	
Topic12	Material requirement planning	
Topic13	Connotation and characteristics of total quality management	
Topic14	Total quality management methods: Pareto chart, causal analysis chart	
Topic15	Business process reengineering	

a unique personal learning environment. At the same time, Tencent Classroom and Tencent Micro Cloud can be used to provide learners with a variety of online learning tools, expand learners’ learning methods, effectively guide learners to carry out in-depth personalised learning, cultivate learners’ independent learning and problem-solving ability, and promote learners’ knowledge construction.

Interactive participation is the essence of MOOC. The sociality of MoOC-based social network learning is mainly reflected in the joint participation in resource construction and the cooperation and communication among learners. The interactive part of “Operation Management” course realises the interaction between teachers, students and learners through Tencent Classroom, QQ communication tool, QQ discussion group, QQ group, QQ forum, QQ space log and other functions provided by Tencent integrated service platform, and builds a social learning network to form a learning community [11].

5.3 MOOC Learning Evaluation Design of “Operation Management” Course

Preparation before the implementation of the course: (1) the course organiser will open the Tencent integrated service platform with QQ and QZone as the core, publish the course objectives and outline on the platform, and set up and publish the course QQ group; (2) the course participants will join the course through the opened Tencent integrated service; (3) the course organiser and the participants will become QQ friends once they are connected, and they will pay special attention to each other to ensure that the content and information updates between them can be browsed by both sides in time.

The construction process of learning outcomes is mainly realised through the individual learning environment based on Tencent’s integrated services, such as publishing learning outcomes through the public space log and other ways; through the function of commenting and replying to the log, the learning outcomes can be exchanged and shared. In addition, the “Operation Management” course organizer also integrated QQ group function and log subscription function to realize the push and mutual evaluation of learning results, so as to realize effective sharing and communication of results.

5.4 Design Idea and Effect of MOOC Practical Teaching Activities in “Operation Management” Course

Design ideas of practical teaching activities.

Operations management is not only a basic professional course, but also a very practical course, so practical teaching is an important link in operations management teaching. In order to enable students to deeply understand the theories learned in class and cultivate their practical ability, the teaching concept of theoretical guidance and curriculum experiment is adopted to go out of class and combine the knowledge learned with practical application. In this way, the practice teaching system of curriculum experiment, extracurricular practice, competition and scientific research is established. Including course design, ERP project experiment, production and operation site observation, enterprise professional internship, enterprise front-line manager lecture. Through this teaching mode, it provides students with a teaching platform of curriculum experiment, extracurricular practice, competition and scientific research, expands the scope of operation management teaching, and improves students’ comprehensive practical ability and employability after graduation.

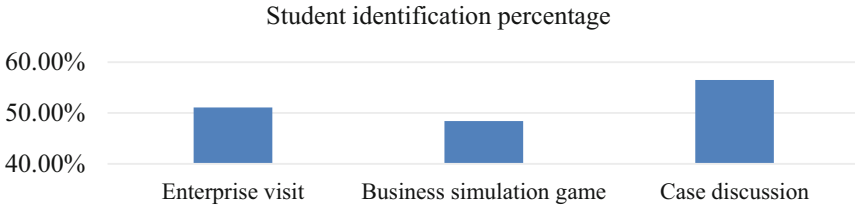


Fig. 2. Survey of practical teaching methods of “Operation Management” MOOC

Table 2. Plan of practical teaching activities

Content	Credit hours	Remarks
Enterprise Cognition Practice	1 week	Sophomore
ERP Sand Table Simulation Course	6 weeks	Comprehensive experimental courses are all offered for business management majors
Lecture on Enterprise Operation Management	4 class hours	Professional department arrangement
Course Design of Operation Management	1 week	After the course theory teaching, the class hours increased from 36 to 42

In the second year of college, students use the short semester to carry out production understanding practice, learn about the operation of industrial and commercial enterprises, and use the summer vacation to participate in social investigation and management practice, which is an important link between theory and practice.

Figure 2. is a survey of the MOOC practice teaching method of “operation management” in a university in Jiangxi Province. Figure 1 shows that “enterprise visit” is 51.1%, “operation simulation game” is 48.4%, and “case discussion” is 43.5%. The practice teaching method ranks first in “company visit”, second in “business simulation game” and second in “case discussion”.

Planning Scheme

The practical teaching activities plan is as follows:

Table 2 The plan of practical teaching activities is from the training plan of business administration specialty of Anhui University of Architecture and Technology of China.

6 MOOC Teaching Methods and Means of “Operation Management”

Through a questionnaire survey on the teaching method of “operations management” in a university in Jiangxi Province, it is found that the main teaching methods with high recognition among students are “case teaching method” (71.0%), “teacher teaching method” (59.1%), “role playing method” (56.5%), “virtual enterprise teaching method”

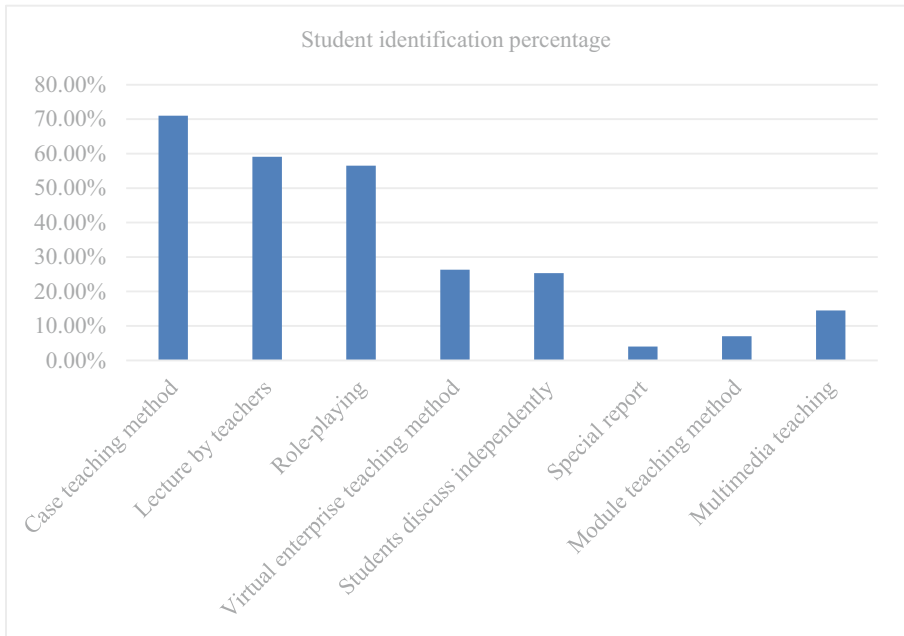


Fig. 3. Percentage of students' approval questionnaire on the teaching method of "Operation Management"

(26.3%), and "student independent discussion" (25.3%). The low level of recognition includes 'special report' (4.0%), 'module teaching method' (7.0%) and 'multimedia teaching' (14.5%) [12]. See Fig. 3. For details.

6.1 Teaching Methods

First, Application of multimedia technology. Teaching with multimedia can expand the amount of information, save class time, enrich the teaching content, improve the efficiency of the lecture and save teachers' labour. In particular, for case teaching, multimedia can be utilized to analyse cases more clearly and motivate students to participate in case discussions. For this purpose, the course team uniformly produced the basic courseware for teaching, and then developed the multimedia courseware for classroom teaching. The courseware is rich in pictures and words, sounds and feelings, and has detailed information, rich content, and vivid forms [13]. The classroom teaching effect is very good, and is widely welcomed by students. Second, Use of film and television materials. For example, by playing the video "Chery car production", "Ruifa construction waste brick making machine production process", "Ruifa construction waste brick making machine production process", "Henan Huatai foam concrete production process", "Henan Huatai foam concrete production process", "Haier electrical appliances" and other film and television materials to show the assembly line production process in front of the students in real, improve students' perceptual understanding. Third, Use the "production operation management teaching website" learning platform [14].

Online access to relevant syllabus, lesson plans, lab guides, exercises, cases and other teaching resources. We will help students to download relevant learning materials. As the construction of the course continues, we will further improve the construction of “Operation Management” online resources and proactively explore a new way to combine classroom teaching with online teaching [15].

6.2 Teaching Reform Measures Such as Homework and Examination

Operation Management coursework focuses on developing students’ understanding and application skills. Case study assignments are added, which have context, numbers and problems and which students are required to write up for analysis. Students need to write analysis reports. Each semester, after two projects, students are required to use the basic theory of the project, analyze the problems of real enterprises, and write a small project paper (2000–3000 words required).

Reform of examination system. The operation management has a relatively complete test question bank, which can be selected from the test question bank so that students can be assessed fairly, objectively and scientifically.

Because the course pays attention to the participation and interaction of students, the proportion of usual performance should be appropriately increased in the course assessment, and the proportion of ordinary performance should be increased to 30%, including the attendance of students, classroom participation (classroom report, case analysis, etc.) and homework. To give 20% of the course assessment weighting to extra-curricular assignments, class presentations, group activities and other grades that reflect students’ independent problem-solving skills, in order to promote students’ competence in the course of their active participation in teaching and learning activities.

7 MOOC Online Open Teaching in the “Operation Management” Course Teaching Effect Influence Factor Model Construction

The teaching effect of MOOC online open teaching in the course of “operation management” can be affected by many factors. This paper considers the influence of six factors, including the reasonable design of MOOC teaching content knowledge points, the quality of MOOC micro-video recording, the professional title of MOOC teachers, the age of MOOC teachers, the gender of MOOC teachers, and the number of class discussions. Moreover, the influence of these six factors on the teaching effect of MOOC online open teaching in the “operation management” course may be non-linear[16, 17]. Therefore, an econometric model is constructed as follows:

$$\ln Y_i = \alpha_0 + \alpha_1 * \ln X_1 + \alpha_2 * \ln X_2 + \alpha_3 * X_3 + \alpha_4 * \ln X_4 + \alpha_3 * \ln X_5 + \alpha_4 \ln X_6 + \varepsilon_i$$

Among them, Y_i represents the teaching effect of MOOC online open teaching in the course of “operation management”; X_1 represents whether the MOOC teaching content knowledge point design is reasonable; X_2 indicates the quality of MOOC micro-video shooting; X_3 represents the title of MOOC instructor; X_4 represents the age of MOOC teachers; X_5 indicates the gender of MOOC teachers; X_6 represents the number of classroom discussions; ε_i is the residual item.

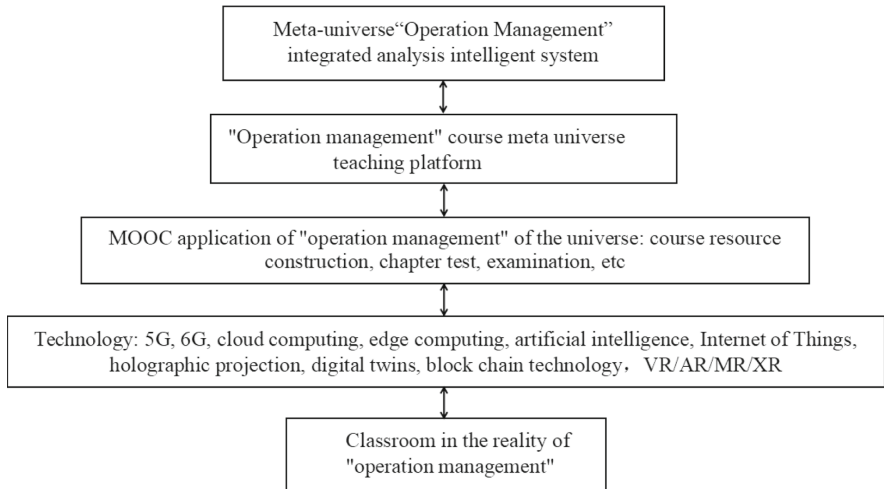


Fig. 4. Construction of the five-tier technical structure model of “operation management” of the universe

In order to use Eviews software to complete the model test of the factors affecting the teaching effect of MOOC online open teaching in the course of “Operation Management”, a questionnaire survey, data collection and statistical analysis are required. This is the research to be conducted in the future.

8 Construction of Five-Tier Technical Structure Model of the Meta- Universe’s Operation Management MOOC

The construction of the five-level technical structure model of the meta-universe’s Operation Management MOOC is shown in Fig. 4.

Based on the “operation management” classroom as the physical foundation, relying on 5G, 6G, cloud computing, edge computing, artificial intelligence, Internet of Things, holographic projection, digital twins, blockchain technology, VR/AR/MR/XR technology, the “operation management” MOOC application: curriculum resource construction, chapter test, examination, etc., the “operation management” curriculum meta universe teaching platform is built, and on this basis, The metauniverse “operation management” MOOC comprehensive analysis intelligent system tracks the students’ “operation management” MOOC learning track, and uses AI, intelligent analysis, and data mining to push high-quality teaching resources for students (Fig. 4).

9 Conclusion

The development of information technology has led to the reform of the traditional “operation management” teaching method and teaching method. MOOC is a very good form to adapt to the development of the information age and meet the teaching reform of

“operation management” course. This paper studies the MOOC construction and implementation plan of “operation management” course. This paper constructs the teaching effect model of MOOC online open teaching in “Operation Management” course and analyses its influencing factors. The results show that the design of knowledge points in MOOC teaching content is reasonable, the quality of micro-video recording, the title of MOOC teaching teacher, the age of MOOC teaching teacher, the gender of MOOC teaching teacher and the frequency of class discussion all affect the teaching effect of “Operation Management” MOOC course. The MOOC practical teaching method of ‘Operation Management’ ranked first in ‘Company Visit’. The most popular MOOC teaching methods were “case method”, “teacher teaching” and “role playing”.

By constructing the “Operation Management” MOOC teaching meta-universe space, the meta-universe and virtual digital people can enter the “Operation Management” MOOC teaching, and students can intuitively experience various application scenarios of the teaching meta-universe. Follow-up research must further optimize the construction of the education metauniverse, and deeply integrate the education metauniverse, virtual digital people, intelligent robot technology and classroom teaching to promote the digital transformation and intelligent upgrading of future education; at the same time, we should meet the needs of education development in the era of artificial intelligence, cultivate intelligent and innovative talents, make the education universe benefit teachers and students, and realize the two-way promotion and benign development of new technology and education. Facing the transformation impulse and transformation brought by the metauniverse to MOOC teaching. Metauniverse may not be realised in MOOC immediately, but exploring the application of its technology in MOOC teaching from the perspective of metauniverse is one of the directions to promote the development of MOOC teaching.

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