



# **Exploring the Cultivation Mode of Innovative Master's Degree Students in New Engineering under the Perspective of New Media**

**Wang Lijun <sup>a\*</sup>, Zhao Zeyong <sup>a</sup>, Shi Jinfa <sup>a</sup>, Zhao Jianlin <sup>b</sup>  
and Tian Baoqiang <sup>a</sup>**

<sup>a</sup> School of Mechanical Engineering, North China University of Water Resources and Electric Power, Zhengzhou, 450045, China.

<sup>b</sup> Henan University of Animal Husbandry and Economy, Zhengzhou, 450045, China.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

With the arrival of the informationization era and the rapid development of information technology, online media has become the main channel of information dissemination in today's society. New media has changed the way people get information, and it also affects the employment and entrepreneurship of master's degree students to a great extent. Therefore, new media should be used as a carrier to strengthen the research on the training mode of innovative master's degree students in new engineering disciplines and explore the construction of an effective new master's degree training mode. This paper analyzes the current situation of the cultivation of innovative master's degree students in new engineering, the trend of cultivating new engineering talents with the help of new media, the opportunities and challenges of the cultivation of innovative talents in

\*Corresponding author: Email: 1471657068@qq.com;

new engineering under the perspective of new media, and combines some of them with a view to providing references for the cultivation of innovative master's degree students in colleges and universities.

*Keywords: New media; new engineering; innovative master's degree student; digital twins; metaverse*

## 1. INTRODUCTION

China has gradually formed a series of new engineering development plans and guiding ideology since 2017, which put forward new requirements for engineering talents in the new era. With the development of technology, the popularization of new media has had a profound impact on all industries, and the cultivation mode of new engineering talents has won new opportunities and challenges.

The cultivation of innovative talents for new engineering is a systematic project, in which the core is to establish a new talent cultivation mode. In the face of new changes in social demand for talents and new requirements for professional development under the new situation, it is an inevitable choice under the general trend of "new engineering" education to revise the cultivation direction at the right time. For this reason, according to the higher level standard of talent demand, it is necessary to carry out systematic research in various aspects, especially to think about the road of professional development by combining its own foundation and current reality. The new engineering innovative talents are different from the traditional engineering innovative talents in terms of knowledge structure and professional foundation, and need to be more open and innovative. On this basis, we should rely on the rich teaching resources, social practice platforms and good academic environment of universities, introduce the flexible and extensive characteristics of new media, explore the training mode of new engineering innovative talents with new media as the carrier, and finally output more innovative master's degree students for the society.

## 2. ANALYSIS OF THE CURRENT SITUATION OF CULTIVATING INNOVATIVE MASTER'S DEGREE STUDENTS IN NEW ENGINEERING SCIENCES

In terms of the development of talent cultivation mode of new engineering, many universities have formed a practical cultivation mode, and the "Fudan Consensus", "Tianda Action" and "Beijing

Guidelines" for the construction of new engineering "trilogy" have gradually been formed in China, however, in the continuous exploration, subject to the fragmented teaching mode of traditional teaching and the separation of the classroom teaching and curriculum design and practice link [1]. The cultivation of innovative talents in the new engineering is still characterized by the following problems:

- (1) Difficulty in keeping curriculum resources up to date

For the cultivation of innovative talents in new engineering, new knowledge and new applications are very important, and in the traditional classroom teaching, the book as the main carrier of knowledge, the class syllabus and classroom content is relatively fixed, it is difficult to realize the classroom resources in teaching to keep pace with the times, and it is difficult to achieve good results through the preparation of the teacher side of the course and it will reduce the teacher's control over the classroom as a whole. China has appeared one after another, such as MOOC, super star and other online open class platform, the purpose is to build the national quality class online resources, however, most of these course platforms are still limited to the form of the course, perfect and high quality course resources and effective form of course resource construction is only applied in a limited range [2,3].

- (2) Limited effectiveness of practical teaching

Engineering teaching is inseparable from a large number of practical teaching support, in the traditional teaching mode, the course practice time is short, the lack of practical resources, part of the course practice can only be observed, many people share a set of practice equipment, the practice effect is not ideal, the practice evaluation stays in the report rather than through the practice of students to master the actual operation of the ability to practice as well as from the practice to get the inspiration and thinking. Part of the course is related to highly sophisticated teaching equipment, such as control courses in the intelligent control system, multi-parameter adaptive adjustment system and

other equipment funds are difficult to put in place, the introduction of other high-precision equipment after the introduction of student operation is too much wear and tear, the later maintenance will also be a considerable expenditure, it is difficult to achieve the expected results of the practice [4].

### (3) Single Teacher Resource

The development of innovative talents in the context of new engineering relies on the development of multidisciplinary integration, and there is a general problem of overly detailed division of specialties in China's colleges and universities, which emphasizes the depth of professional knowledge but is light on the breadth of basic knowledge [5]. In traditional teaching, the college as a unit, the teacher's background is relatively centralized, it is difficult to realize the teaching of multidisciplinary integration, which is unfavorable to the cultivation of innovative talents in new engineering, and gradually try the cross-division curricular arrangement in many schools, for example, the "Design and Construction" course of Tianjin University has become a benchmark course of new engineering in China [6].

Therefore, in order to realize the goal of "people-oriented" education, it is necessary to give full play to the unique advantages of the application of new media in education. As a product of the development of contemporary human society, new media provides unprecedented convenience for the cultivation of innovative master's degree students. With the deepening of new media application, more and more colleges and universities have begun to integrate new media into the traditional education system.

## **3. ERA TRENDS OF INNOVATIVE MASTER'S DEGREE PROGRAMS IN NEW ENGINEERING UNDER THE PERSPECTIVE OF NEW MEDIA**

With the arrival of a new round of scientific and technological revolution and industrial revolution, the era of "Internet Plus" has quietly arrived, and the development of technology has moved from the era of information technology (IT) to the era of digital twins (DT) and artificial intelligence (AI), and research and industry have gradually become a hot spot, and the education of engineering needs to be improved in terms of the direction of cultivation and the methodology and methods of cultivation. Improvements are

needed to adapt to the various requirements for talents in the society in the new era. "Internet+" is a brand-new thinking mode, under which people can obtain the required information anytime and anywhere through the new media platform according to their own needs. The use of big data analysis technology establishes a comprehensive and accurate user portrait, realizing precise service and personalized guidance. The existence of new media greatly shortens the communication distance between teachers and students and between students and students, breaks the traditional classroom restrictions, and expands the boundaries of classroom resources [7]. The main trends of the innovative master's degree training methods of new engineering under the perspective of new media are as follows:

- (1) New media helps students to be much more empowered

The course evaluation system under the application of new media is quantitative and precise. The application of new media in teaching can provide accurate quantitative data for the course, through the decomposition of each knowledge point in the classroom and the objectives of the course can realize the accurate evaluation of the level of knowledge mastered by the students, and further build a more perfect course evaluation system.

The teaching effect is greatly strengthened under the application of new media. On the one hand, the application of new media has changed the limitations of traditional teaching based on the classroom, on the other hand, the application of new media greatly enlivens the classroom and the atmosphere after class, such as the classroom release of some of the questions and answers, discussions, etc., the means of teaching is further enriched. Classroom is the core of teaching activities, and the cultivation of innovative master's degree students in new engineering disciplines cannot be separated from the classroom teaching in high-quality colleges and universities.

At present, a large number of colleges and universities have introduced platforms such as "Super Star Learning Channel" and "Rain Classroom" as well as some colleges and universities have researched their own online platforms [8,9] to assist teaching and assisting teachers in classroom control, evaluation of the courses, and the school's control of the quality of teaching. control of teaching quality.

(2) New media helps students' knowledge networks become richer

New media tools provide convenient conditions for students to access a wider range of knowledge, through the instructional design, the classroom can be separated from the objectives of the classroom, the teacher to provide the appropriate resources to share for the students in the classroom in the breadth of knowledge, the depth of knowledge to further expand the chances of reducing the students to give up further learning because of the collection of information, while the teacher does not need to carry out additional preparation of such resources, to improve the target of the The teacher does not need to prepare additional lessons for such resources, which improves the concentration on classroom teaching. Knowledge system is an important foundation for the cultivation of innovative master's degree students in new engineering disciplines, and a rich knowledge network provides continuous support for innovative master's degree students in new engineering disciplines.

(3) Closer cross-fertilization of disciplines in the new media

Under the background of new media, the barriers of various disciplines are gradually decaying, and for the cultivation of master's degree students in new engineering disciplines, multidisciplinary integration is an important starting point for the growth of innovation ability. Through the application of new media, students can more conveniently contact excellent experts and scholars in various disciplines and understand the basic knowledge and application of various disciplines, so as to realize the situation of taking their own disciplines as the main body and integrating the advanced ideas of multiple disciplines for innovation. Cross-integration is a key factor in the improvement of innovation ability of innovative master's degree students in new engineering disciplines, and the ability to integrate and pass through multiple disciplines is an important condition for students' innovative ideas.

#### **4. OPPORTUNITIES AND CHALLENGES OF CULTIVATING INNOVATIVE MASTER'S DEGREE STUDENTS IN NEW ENGINEERING UNDER THE PERSPECTIVE OF NEW MEDIA**

In today's rapid development of new media, the innovative talent model of new engineering is

also facing different opportunities and challenges. On the one hand, new media brings new knowledge media, which provides a more flexible method for the cultivation of new innovative master's degree students in new engineering, and on the other hand, based on the development of new media, it can revolutionize the cultivation system of new engineering and establish a new cultivation method.

(1) All-media matrix builds knowledge base of course expertise

Under the background of new media, all walks of life are developing and evolving in the direction of all-media, and under such a background, General Secretary Xi emphasized "a profound understanding of the challenges and opportunities of the all-media era" [10]. In education, the application of all-media platform also has unlimited possibilities. In the traditional teaching mode, the classroom resources are limited to textbooks and teachers, and students will consume a lot of time to look for relevant information in public resources, which are mixed with a large amount of non-professional information, which may cause problems to students' knowledge mastery. In the context of new media, through the public number, short videos and other channels, the teacher team can build a private all-media matrix of course resources, using knowledge mapping, artificial intelligence and other means to provide students with a more comprehensive and professional database for pre-study, review, consolidation of key points, etc., which can be used directly by clicking on the students when they need it. Learners can customize their own learning content, using fragmented time to supplement relevant knowledge and independent learning [11].

Recently, with the popularity of the artificial intelligence software ChatGPT, the output of the full media matrix has been enriched with more forms, and ChatGPT has gained a lot of attention in all walks of life, including the education field, with its powerful conversation ability and logical analysis ability [12]. Especially with the all-media matrix as the core knowledge base, the ChatGPT model is used for adaptation training, and in teaching, the trained ChatGPT can then participate in teaching in the form of questions and answers, becoming a powerful assistant in teaching.

However, the construction of a private resource base requires teachers to invest in the first stage, the construction of a professional knowledge base within the course and related extended materials requires an absolute professional foundation, while the construction of the relevant local platform requires a certain foundation of new media operation, and at the same time, teachers need to carry out a professional review of the relevant resources, to ensure that the breadth of knowledge while ensuring the correctness of knowledge. The application of ChatGPT brings more serious thinking, such as the use of all-media matrix with ChatGPT can almost complete the teaching of all the teaching knowledge points, at this time, what is the significance of the teacher? What is the significance of teaching? How to ensure the security of data? These are the problems that need to be solved before this teaching mode is widely used [13].

## (2) Digital Twin Extended Instruction

In the IT era, the demand for products, technologies and talents is standardized, while in the DT era, more emphasis is placed on uniqueness, personalization and specific problem solving. With the construction of "New Engineering", talent cultivation has new requirements in education process and export quality. With the proposal and application of digital twin, digital twin classroom has become a new teaching mode, which can improve students' practical participation and practical effect by constructing digital twins for classroom practice. The digital twin practice teaching through the virtual reality interactive features to ensure that students in the virtual end of the course practice can also achieve a certain learning effect, the digital twin mode to support the creation of learning scenarios, teaching conditions are difficult to meet the subjects through the digital twin practice teaching can also be real-time, quality of the virtual scene creation. For example, in the practical teaching of vehicle engineering, most schools are limited by the equipment, site constraints, it is difficult to realize the full participation of each student in the course time, such as the whole car, engine and transmission disassembly experiments, almost no students can be restored to the parts, which caused a lot of losses. The digital twin technology allows students to disassemble the virtual entity before the field operation of the experiment, the use of digital twin technology allows students to familiarize themselves with the parts of the parts

in advance, to achieve the appropriate level and then carry out the actual operation to strengthen the practical ability of the students. The experimental session is no longer purely a teacher demonstration of the process of students in groups. Instead, it advocates the design of their own experiments, independent combination of theory and practice, make full use of the theoretical design of the content, steps, methods and synthesis, around the experimental purpose of the experimental process independently, low-cost to achieve high-quality course practice, improve students' comprehensive ability.

In addition, the digital twin for the classroom can build a virtual model of the student's learning level, combined with an all-media-based knowledge base for students to customize knowledge resources, to achieve the real "student-centered", in the teacher's resources are relatively fixed conditions to achieve targeted teaching, and to further realize the digital twin classroom or even the digital twin college [14].

However, for the digital twin in teaching, it also requires a large amount of investment in the early stage, not only need to build the all-media matrix, but also need to analyze the needs of students and put forward higher requirements for the construction of new media platforms. For example, it is necessary to construct a high-fidelity model of real-time interconnection for practical courses, analyze and construct a twin model of students' learning level of hair data, and assess and analyze the ability of different students' practical ability courses based on the twin model.

## (3) Metaverse breaks down classroom boundaries

The emergence of meta-universe characterized by intelligent content co-creation, decentralized dynamics and editable world is reshaping various industries [15]. Similarly, the development of meta-universe provides more possibilities for the teaching of new engineering disciplines, the traditional teaching mode in which teaching time and space are limited, teaching is based on teachers' lecturing and students' passive acceptance, and it is difficult to take into account the different levels of students in teaching, and it is difficult for students to have an immersive sense of touch in the current mainstream online education, and it is difficult to achieve the rich teacher-student interactions in offline education [16]. Through meta-universe teaching, a virtual

world parallel to the real world can be realized, and students can recognize each other's learning effects in both the real and virtual worlds, thus reducing the pressure of the classroom, developing the teaching mode of "the basic teaching is based on the real classroom, and the improvement of competence is based on the meta-universe classroom", and providing students with different levels of education with the corresponding progress of teaching content and improving the overall progress of students. It can provide students of different levels with appropriate teaching contents and improve the overall learning effect of students. Some scholars even think that this technology can realize the extension of online education, and eventually become an education mode that converts the "information presence" of teachers and students into "physical presence", thus making up for the immersion teaching effect that cannot be achieved in online education [16].

However, the development of meta-universe technology itself is not mature, and its application in classroom teaching has a great vacancy, especially in the immersive classroom scene, scene-based teaching mode, through the construction of the teaching platform is almost no experience to follow, and need to carry out a lot of exploration.

## **5. COUNTERMEASURES FOR THE DEVELOPMENT OF INNOVATIVE MASTER'S DEGREE CULTIVATION MODE OF NEW ENGINEERING UNDER THE PERSPECTIVE OF NEW MEDIA**

- (1) Clarifying the Role and Positioning of New Media in the Training of Innovative Master's Degree Students in New Engineering Disciplines

The role of new media in teaching is very important, it is about the nature of teaching. Based on the new media to build a full-media matrix contains the content of the professional curriculum, and can even become an omniscient virtual teacher, however, in the teaching activities, such a virtual means can not completely replace the teacher, the teacher is not simply a collection of information its responsibility lies in the teaching of the work of the responsible for the students, responsible for the students, it is the "knowledge, emotion, and the ability of the Trinity" [17]. Obviously, even in the foreseeable future, the application of deep artificial intelligence, the classroom constructed by new

media can only be responsible for the knowledge, therefore, whether it is the all-media course resource library, digital twin classroom practice or meta-universe classroom construction, these can only be used as an auxiliary to the classroom rather than the main body of the classroom. A more ideal new media teaching model should make new media become the teacher's tool, not the teacher's replacement.

- (2) Investing in a better network of curriculum resources

Although there are already a large number of course resources on the network, for different classrooms in different colleges and universities, a more targeted private course resource network should be constructed, where privatization is not the traditional sense of outsiders can not be accessed privatization, but privatization of the construction of the resource network. That is, the school team to organize the construction, including the relevant disciplines of teachers' resources, the preparation of course materials, curriculum-related materials to expand the formation of a special network of curriculum resources system and then public, and later uploaded by the teaching team is responsible for updating the information. This is because most of the current curriculum on the network can be found on the relevant resources, if only a collection of these resources that are not applicable to students with different teaching backgrounds, and students in the school through the new media resources are still exposed to the network of resources will not pay attention to the teaching effect will be affected, especially the cultivation of innovative talents is the need for innovative teaching by example. Therefore, it is necessary to customize a special curriculum resource network, and the control of the later knowledge-based resources by the teaching team is also in such considerations.

- (3) Build a specialized new media operations team

New media-based resources need to be controlled by specialized teaching teams, but specialized new media technology operations teams should be set up in broader units. New media technology management is replicable, within the school can be set up specifically for the curriculum of the new media team docking the school's various courses team, so as to achieve less people to achieve greater value, and at the same time to change the teacher side

of the current need for professional curriculum knowledge control, and at the same time need to part-time for the development of new media resources and operation of the status quo, to release the pressure on the teacher side, and at the same time to achieve more professional results. The result is to release the pressure on the teachers' side and to achieve more professional results.

#### (4) Practice of Cultivating Master's Degree Students in New Engineering under the Perspective of New Media

Xihua University and Dujiangyan Melting Media Center build a joint cultivation base for Master's degree students in journalism and communication: In this case, Xihua University and Dujiangyan Melting Media Center build a joint cultivation base for Master's degree students in journalism and communication, aiming to improve the quality and practical ability of graduate students. The two sides have been working intensively on cooperation through the principles of resource sharing, complementing each other's strengths, mutual collaboration, mutual benefit and common development, and have reached a consensus on the construction of the base, academic exchanges and talent training.

## 6. CONCLUSION

Under the perspective of new media, the cultivation mode of new engineering master's degree should focus on the integration of industry-university-research, practical teaching, academic exchange, interdisciplinary cultivation, faculty building and curriculum innovation, in order to improve the comprehensive quality and practical ability of graduate students, and to cultivate professionals adapted to the needs of the new era.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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