



Research on Teaching Optimization of Internet plus Classroom enabled by Big Data Technology

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Abstract. In this paper, teaching features of part-time graduate education are explored comprehensively and after a thorough analysis of problems as well as challenges faced in part-time graduate courses, a part-time graduate teaching mode based on the Internet plus Classroom is proposed. Benefited from the rapid development of information technology and the deep application of big data, and mobile internet, various online platforms can provide rich educational big data. This paper investigates how to optimize the postgraduate teaching of Internet plus classroom, make full use of teaching big data and build an evaluation model for online teaching. This paper analyses the feasibility of the model, teaching design, implementation process, and explores relevant issues that need to be paid attention to when the model is effectively implemented, which promotes continuous improvement of the quality of part-time graduate teaching through differentiated training mode.

Keywords: Internet plus Classroom, part-time graduate student, teaching optimization, big data

1 Introduction

The scale, complexity, and comprehensive impact of engineering activities have reached an unprecedented height, which greatly increases the demand for technical and managerial talents in the engineering field. MEM, as a newly established professional degree, has achieved rapid development in less than ten years and has trained a large number of engineering management talents for society [1]. Compared with the five-year (two years off-job, three years on-the-job) MEM in foreign countries, China's MEM training can be described as short and fast, and the duration of schooling in most cases does not exceed 3 years. MEM of Shenyang University is only open to on-the-job candidates and the duration of schooling is 2 years. It is a very challenging task to achieve the training goal so well in such a short time.

On September 14, 2016, the Office of the Ministry of Education issued the file, No-tice on Coordinating the Management of Full-time and Part-time Graduate Students (Jiao Yan Ting [2016] No. 2), which clearly stated that from 2017 onwards, the

ad-mission and enrolment of part-time graduate students and full-time graduate students would be in line with national unified requirements, implementing the same policies and standards [2-3]. Unified recruitment and integrated management will be implemented on graduate education of part-time and full-time graduates, which is a rightly an important measure to improve the quality of part-time student and the value of qualification of their degrees. Although part-time graduate education is carried out in a non-detachment learning way, the entire training process is also included in the evaluation range of degree-granting points, which is an important form of graduate education that has the same status as full-time graduate students. During the learning process of part-time graduation, students face many problems, including the difficulty of carrying out teaching activities. Unlike full-time graduate students, the part-time MEM graduate students are mostly on-the-job personnel, and their off-site learning approach makes them have both social responsibilities and learning tasks. When the two conflicts, social responsibilities are more important, and they may even give up their graduate studies if necessary.

Many scholars tend to propose the reform of postgraduate education by analysing the factors that affect education quality assurance for guidance and advice [4-6]. With the rapid development of information technology, the explosion of data produced by society every day has grown exponentially. Figure 1 shows the size of global data each year. In the book *Big Data: A Revolution That Will Transform How We Live, Work, and Think*, Viktor Mayer-Schönberger predicted that 2013 marked the beginning of the Big Data era, signifying a new phase in the development of information technology [7].

Since the outbreak of the COVID-19, colleges and universities across the country have actively responded to the call of the Ministry of Education and launched the largest online education so far. Education content, tools, and platforms have poured in like a tide, which has impulsively promoted the development of online teaching. However, with the rapid expansion of the number of graduate students, online teaching mode is almost a new challenge for student learning, teacher teaching, and school management. The improvement of online teaching quality requires scientific evaluation and protection of online teaching.

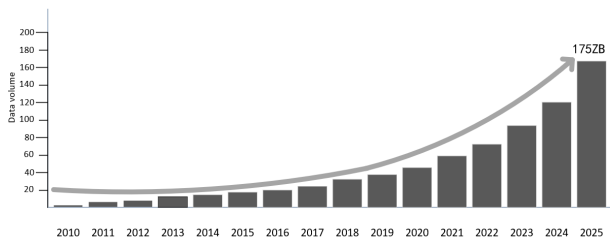


Fig. 1. Annual scale of global data

The change of traditional learning model is imminent, especially for part-time graduate students. How to Adhere to the same standard to ensure the same quality in the case of different learning conditions has become an urgent problem to be solved.

The document [2016] No. 2 pointed out that multiple ways and flexible time arrangements can be adopted for non full-time learning when it comes to the education of part-time graduate students, which provides a basis for introducing online teaching models.

Internet plus Classroom is an important link in the process of education reform. How to fully play the main role in the mixed teaching mode, make reasonable use of information technology and resources, optimize the teaching process, improve teaching effectiveness and educational effectiveness, and promote teaching reform through information evaluation and analysis is an urgent direction to be explored in current education reform.

To summarize, with the promulgation and implementation of national policies on part-time graduate education, China's part-time graduate education has embarked on a developmental path of connotation. Given the significance of part-time education master's degree education and the problems it faces, this study analyses problems and improvement measures of part-time MEM graduate education under the background of big data, providing an important means to improve the quality of training after the admission of part-time graduate students under new situations.

2 The problems faced by online teaching

The development of online courses in the United States started earlier, and the quality evaluation system is more mature, with more comprehensive quality evaluation standards. The University of Michigan has developed Online Course Evaluation Guidelines and Metrics. California State University has developed Online Course Quality Metrics. Maryland-, online education quality assurance agency, has developed QM Online Course Quality Evaluation Standards. The UK has developed eight evaluation factors for teaching and learning, and teachers, schools, and students evaluate these factors using objective and comprehensive investigation methods to improve teaching. Japan's course instruction evaluation pays more attention to quality evaluation. It comprehensively evaluates students' learning attitudes, knowledge comprehension and mastery, skills and learning performance, and thinking ability based on the standard of survival ability. Overall, the evaluation of blended learning mainly includes having students fill out relevant questionnaires online or offline after completing the course, and conducting in-depth analysis based on the communication and discussion content between teachers and students during blended learning. However, this evaluation method is only applied to student evaluation, and the evaluation tool for teachers is still under exploration.

Compared with traditional teaching mode, there have been significant changes in the management and teaching process in online teaching classrooms. Online teaching breaks the limitations of time and space, providing rich learning resources, learning data, as well as diverse teaching and learning methods [8-10]. However, the lack of comprehensive student management, the lack of active classroom atmosphere, and scattered knowledge without a system also make it a breeding ground for shallow learning.

Moreover, the traditional teaching quality monitoring mode is relatively closed, and the data generated during the teaching process is static, making it difficult to analyse and utilize the data effectively. Due to the different nature of disciplines and schools, major universities in China have not formed a unified evaluation system for class-room teaching quality. Generally speaking, the existing evaluation systems have more or less subjectivity and limitations. It is even impossible to rule out human factors in teaching evaluation. With the advent of the big data era, big data technology has had a profound impact on the Internet, telecommunications, finance, and other industries, and the value of data and data analysis is even more significant in universities.

The flipped classroom teaching mode is an effective way, which requires students to independently learn relevant knowledge and content online before face-to-face teaching, which has greatly increased their requirements. Many students have been accustomed to passive learning since childhood and find it difficult to learn independently, especially for students with low self-awareness. Improving students' autonomous learning ability and teaching them how to learn and explore are key issues to be addressed in curriculum and teaching reform.

3 Thoughts on Internet plus Classroom teaching

3.1 Strengthen the entire process management of classroom teaching

Classroom is the main battlefield for implementing teaching activities. One of the most important manifestations of the deep integration of information technology and education is the informatization of classroom teaching. Online courses have made great progress under the promotion of the Internet plus Education model, and high-quality educational resources have been shared, which has improved students' learning in different fields and enriched the ways of teaching. Strengthening the management of the entire process of classroom teaching, building a comprehensive Internet plus Classroom teaching quality monitoring system, among which the deep teaching quality evaluation model that meets the background of the new era of education is a key. Before the outbreak the epidemic, only a few courses in universities adopted a mixed online and offline teaching method, which accounted for a very small proportion of all courses. Therefore, universities have not formed a set of teaching quality evaluation indicators specifically for online teaching. Classroom is the main battlefield for implementing teaching activities. One of the most important manifestations of the deep integration of information technology and education is the informatization of classroom teaching. Online courses have made great progress under the promotion of the Internet plus Education model, and high-quality educational resources have been shared, which has improved students' learning in different fields and enriched the ways of teaching. Strengthening the management of the entire process of classroom teaching, building a comprehensive Internet plus Classroom teaching quality monitoring system, among which the deep teaching quality evaluation model that meets the background of the new era of education is a key. Before the outbreak the epidemic, only a few courses in universities adopted a mixed online and offline teach-

ing method, which accounted for a very small proportion of all courses. Therefore, universities have not formed a set of teaching quality evaluation indicators specifically for online teaching.

3.2 Optimize the online teaching quality monitoring system

By utilizing big data technology, we can discover the constraining factors that affect the teaching quality in higher education and provide powerful support for optimizing the teaching quality monitoring system [11]. With the vigorous promotion of online teaching, we can easily obtain rich educational big data from online teaching platforms, providing support for evaluation methods, avoiding manual evaluation methods, and promoting online classroom teaching quality through the intelligent analysis of teachers' and students' behaviours and emotions, as well as promoting teachers' professional development and students' autonomous learning. The deep integration of intelligent technology and Internet plus Classroom teaching system design, and the comprehensive evaluation of the classroom teaching process from multiple evaluation subjects, diversified evaluation methods, and various indicator observation points, etc., will build an executable and quantifiable teaching evaluation system. It is a powerful guarantee for improving the quality of graduate education.

3.3 Expand assessment indicators for online teaching platforms

Firstly, we should increase the assessment indicators for online teaching platforms, including secondary indicators such as the proficiency of teachers and students in using online teaching platforms, the supportiveness of technical support for using online teaching platforms, and whether online teaching platforms can meet the needs of teachers and students for teaching and learning. Secondly, based on classroom big data such as audio and video data from both teachers and students, we should establish emotional and behavioural analysis models based on deep learning theory. We should comprehensively apply video analysis, speech recognition, and other methods to analyse the emotions, behaviours, and voice features of both teachers and students, dynamically record the teaching process, and conduct evaluations. Additionally, we should increase the weight of teaching implementation indicators, including whether the teaching staff can clearly express and thoroughly analyse the course content, whether the course design and teaching methods are suitable for online teaching, and whether they can stimulate students' interest in learning. Finally, we should use teaching resource indicators instead of course construction indicators. Online teaching modes need to redesign courseware and related teaching content, both in terms of content and form, to meet the needs of online teaching, especially when it is difficult to use blackboard writing in an online classroom.

3.4 Select diversified evaluation subjects

Internet plus Classroom emphasizes student-cantered learning through online self-learning and offline collaborative learning, achieving mastery and improvement of

knowledge and skills while emphasizing student participation and contribution in the classroom. Therefore, in addition to teacher evaluation of students, the evaluation body also includes self-evaluation and group evaluation by students. At the same time, with the deepening of school-enterprise cooperation, enterprise mentors participate in the top-level design of courses and strengthen their participation and evaluation. The evaluation of Internet Plus Classroom teaching involves multiple teaching stages, such as formative assessment of student participation, video viewing times, testing, and speaking in the online platform; process evaluation of project implementation, simulation training, etc. conducted in small groups through collaboration and competition offline; commenting and guiding of enterprise mentors on simulation projects; self-evaluation, group testing, group evaluation, etc. in PBL contextual teaching methods. In consideration of various stages, diversified evaluation methods are introduced based on traditional evaluation methods.

The evaluator is not restricted by time and space when submitting evaluation information to the management department, making the process more convenient and efficient. The accuracy of data and information is also higher, resulting in more reliable evaluation results that are more readily accepted by the evaluated subject, and ultimately having a positive effect on improving teaching quality.

4 Conclusion

With the rapid development of Internet Plus and artificial intelligence, using information technology to improve traditional classrooms has become an important way to reform classrooms. The deep integration of information technology and classroom teaching is not only a new educational and teaching model but also a new way of providing educational services. Under the background of Internet Plus, the innovative mode of non-full-time MEM postgraduate education quality construction should focus on the technical perspective, based on the Internet Plus education concept, continuously enrich the Internet plus Classroom teaching mode, and apply this mode to promote postgraduate education reform. It can not only stimulate students' learning enthusiasm and independent research ability, but also expand the space and time of teaching and learning, and meet the needs of differentiated postgraduate training, achieve targeted teaching, and effectively enhance the research ability of postgraduates. In the Internet era, actively exploring and developing non-full-time postgraduate online teaching models are in line with the trend of the times and have broad development space.

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