Liaoning Path of "Three Teachings" Reform Driven by Generative AI in Universities

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Abstract

This paper discusses the path of "Three Teachings" reform in Liaoning universities driven by generative AI, analyzes the challenges faced by universities in Liaoning in terms of teaching staff, textbook construction and teaching methods, and puts forward corresponding solutions. This paper proposes to build a reform ecology with deep integration of technology and education, and realize a high-quality development pattern of "teachers make good use of AI to improve teaching", "teaching materials are embedded in AI to reflect the frontier" and "teaching methods rely on AI to stimulate innovation" through three dimensions: remolding teachers' ability, innovating teaching materials and innovating teaching methods. At the same time, the article emphasizes the coordinated support of system, platform and ecology, and provides guarantee for the path landing through policy guidance, platform construction and school-enterprise cooperation. This study provides theoretical guidance and practical path for the reform of "Three Teachings" in universities in Liaoning, and also provides reference for the reform of higher education in other regions.

Keywords

Liaoning; "Three Teachings" Reform; Generative AI; Universities.

1. Introduction

Digital transformation has become the general trend of global education development, and artificial intelligence (AI), as one of the most subversive technologies, is profoundly changing the form, mode and concept of education. Especially under the impetus of generative AI technology, the field of education is welcoming a new revolution [1]. Generative AI provides brand-new ideas and tools for the reform of higher education with its powerful content generation ability, high customization ability and intelligent interactive experience.

In the reform of higher education, the reform of "Three Teachings" (teachers, teaching materials and teaching methods) has always been at the core. Teachers are the first resource of education, and their quality and ability are directly related to the quality of education [2]; Teaching material is an important carrier of knowledge inheritance, and its content and form directly affect students' learning effect; Teaching method is the key link of teaching activities, and its innovation and optimization can effectively improve teaching efficiency [3]. Therefore, how to promote the reform of "Three Teachings" in universities with the help of generative AI technology has become an important topic in current educational research and practice.

As an important old industrial base in China, Liaoning has a relatively perfect higher education system and rich educational resources. However, under the influence of traditional educational models and concepts, universities in Liaoning still face many challenges in the reform of "Three Teachings", such as teachers' low information literacy, slow updating of teaching materials, and single teaching methods. These problems not only restrict the development of higher education in Liaoning, but also affect the quality of personnel training. Therefore, it is of great theoretical

significance and practical value to explore the effective path of "Three Teachings" reform in Liaoning universities driven by generative AI, so as to improve the overall level of Liaoning higher education and cultivate high-quality talents to meet the development needs of the new era.

2. An Analysis of the Current Situation of "Three Teachings" in Universities in Liaoning

(1) Present situation of teaching staff

Some teachers lack practical experience and professional quality, especially the professional course teachers in higher vocational colleges, who have been divorced from the actual production environment of enterprises for a long time and have insufficient understanding of new materials, new processes, new equipment and new technologies, resulting in their professional skills lagging behind the development speed of the industry. In addition, professional teachers are weak in ideological and political education, and it is difficult to realize the effective combination of "preaching" and "teaching" [4]. With the popularization of generative AI technology, teachers need to change from traditional knowledge imparting to learning designers, guides and resource managers. However, at present, many teachers have not adapted to this change, lack the ability to use intelligent tools for personalized teaching, and also face the risk of technical dependence and ethical challenges. Liaoning province has improved teachers' technical application ability by organizing special training, but there are still differences in resource allocation between regions and schools. Some colleges and universities have tried to build a "three-subject" collaborative education model, but the scope of promotion is limited.

(2) Current situation of teaching material construction

The updating cycle of existing teaching materials is long, and it is difficult to reflect the industry trends and technological innovations in time. The low participation of industry enterprises leads to outdated teaching materials and poor operability, especially the lack of adaptation to the skills needs of emerging industries. For example, there are insufficient training resources in the fields of industrial robots and digital finance [5]; At the same time, traditional paper textbooks are still dominant, and the static presentation mode with poor interaction affects the efficiency of students' understanding of abstract concepts.

Teaching materials for specialized courses are mostly compiled by subject experts, and the goal of ideological and political education is not systematically integrated into the knowledge system, resulting in the phenomenon of "two skins" between values guidance and professional teaching. Although some pilot courses try to reconstruct the content, they have not yet formed a large-scale solution. Relying on generative AI technology, some universities began to explore dynamic teaching material design. For example, mathematics courses use AI to generate visual models to assist teaching, and the construction of interdisciplinary case base also enhances the practicality and interest of teaching materials [6]. However, the digital coverage of teaching materials in the whole province still needs to be improved.

(3) Present situation of teaching methods

Cramming teaching is still the mainstream, and the application ratio of new teaching methods such as project teaching and situational teaching is low. Mechanical repetitive operation is mostly used in the training process, and there is no real work scene simulation, so the space for students to explore independently is limited. This single teaching method is difficult to stimulate learning interest and also restricts the cultivation of innovative ability. Some colleges and universities introduce virtual simulation laboratories and online platforms to carry out mixed teaching. However, most classrooms have not yet achieved accurate data-driven decision-making, and the depth of teacher-student interaction is insufficient; In addition, the

evaluation system is still result-oriented, and the process assessment mechanism is not yet perfect. Generative AI provides the possibility for personalized learning path design and real-time feedback. However, teachers' teaching integration ability of AI tools is uneven, and excessive dependence on technology may lead to alienation of teacher-student relationship.

(4) Highlights of policy and practice

As a pilot province of national vocational education reform, Liaoning took the lead in promoting the connection between the "1+X" certificate system and academic education. By disassembling the vocational skill standards, a certification unit library is formed, and the accurate docking of course content and post ability is realized [7]. This model not only forces the reform of teaching materials, but also promotes the cooperation between schools and enterprises to develop characteristic teaching resources. The establishment of Liaoning AI empowerment education and teaching reform and development alliance has integrated the resources of universities in the province and promoted the application and demonstration of AI technology in curriculum development, teacher training and other fields. This kind of inter-school consortium is helpful to solve the problem of lack of reform resources in small and medium-sized colleges and universities.

(5) Major challenges

The normalization mechanism of industry enterprises' participation in textbook compilation and curriculum design has not yet been established, which leads to structural contradictions between education supply side and industry demand side. The technical literacy of backbone teachers has improved rapidly, but the progress of digital transformation of the whole team is slow, especially for middle-aged and elderly teachers. The existing assessment still focuses on knowledge memory rather than ability construction, and lacks multi-dimensional evaluation tools for students' innovative thinking and practical ability.

The reform of "Three Teachings" in Liaoning University has made progress in stages driven by policies, but it still needs to break through the traditional path dependence in teacher transformation, textbook innovation and teaching method innovation. In the future, it is necessary to further develop the technological advantages of generative AI, deepen the cooperation mechanism between schools and enterprises, and build a student-centered educational ecosystem.

3. Path design of "Three Teachings" reform driven by generative AI in Liaoning University

3.1. Constructing the reform ecology of "technology-education" deep integration

The overall goal of Liaoning's path design is to take generative AI as the technical engine, and form a closed-loop reform of "technical empowerment-institutional guarantee-ecological coordination" by systematically reconstructing "teacher's ability system", "teaching materials embedded in AI reflect the frontier" and "teaching methods rely on AI to stimulate innovation", so as to finally realize the high-quality development pattern of "teachers make good use of AI to improve teaching" and "provide high-quality talent support for Liaoning's all-round revitalization. Specifically, it can be decomposed into three dimensions as shown in Figure 1.

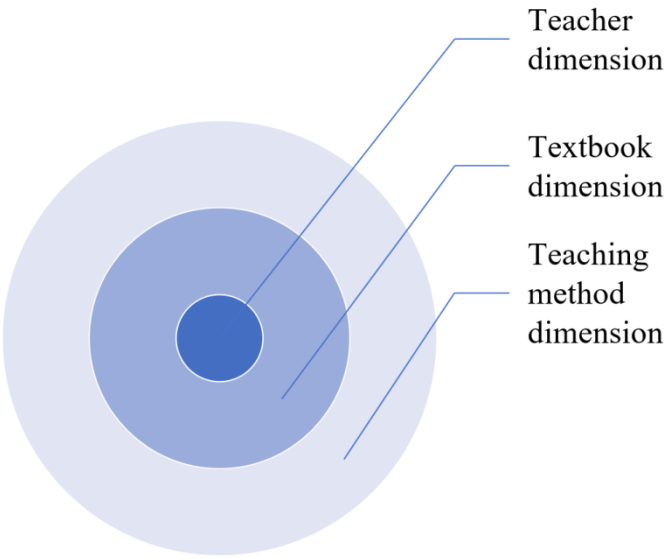

Figure 1. Three dimensions of providing high-quality talent support

The teacher dimension promotes the transformation of teachers from knowledge imparting to AI collaborative teaching designers, focusing on improving their AI tool application ability, man-machine collaborative teaching design ability and generative content ethical judgment ability; In the teaching material dimension, a new teaching material system of "AI integration" is developed, and the application scenarios of generative AI are transformed into teaching cases, and dynamically updated knowledge modules and practical tasks are embedded [8]; Innovative AI-driven personalized, inquiry-based and project-based teaching mode is used in the teaching method dimension, and the generative AI is used to realize the precise teaching of "teaching students in accordance with their aptitude", the immersive learning of "integration of reality and reality" and the collaborative community of "learning together between teachers and students".

3.2. Key design direction of Liaoning path

(1) Rebuilding teachers' ability——Hierarchical and classified "AI+ Teaching" ability improvement system

In view of the significant difference in digital literacy among teachers in Liaoning University, a three-level training system of "basic popularization-advanced application-innovation leading" is designed (as shown in Figure 2). At the basic level, all teachers are trained in the operation of generative AI basic tools, focusing on solving the problem of "not using"; In combination with the characteristics of disciplines, the advanced class develops "customized disciplines" training courses to guide teachers to embed generative AI into the whole process of lesson preparation, teaching and evaluation; Relying on the "AI+ Education" demonstration center of Liaoning University, the innovation layer cultivates the "AI teaching pioneer team", explores new modes such as "man-machine collaborative teaching" and "generative task-driven learning", and forms a replicable typical case [9]. At the same time, the mechanism of "policy encouragement+assessment guidance" should be established: AI teaching ability should be included in the evaluation and appointment of teachers' professional titles and the selection index of teaching achievement awards, and teachers should be encouraged to take the lead in declaring the educational reform project of "integrating generative AI into the curriculum" to promote the transformation from "passive adaptation" to "active innovation".

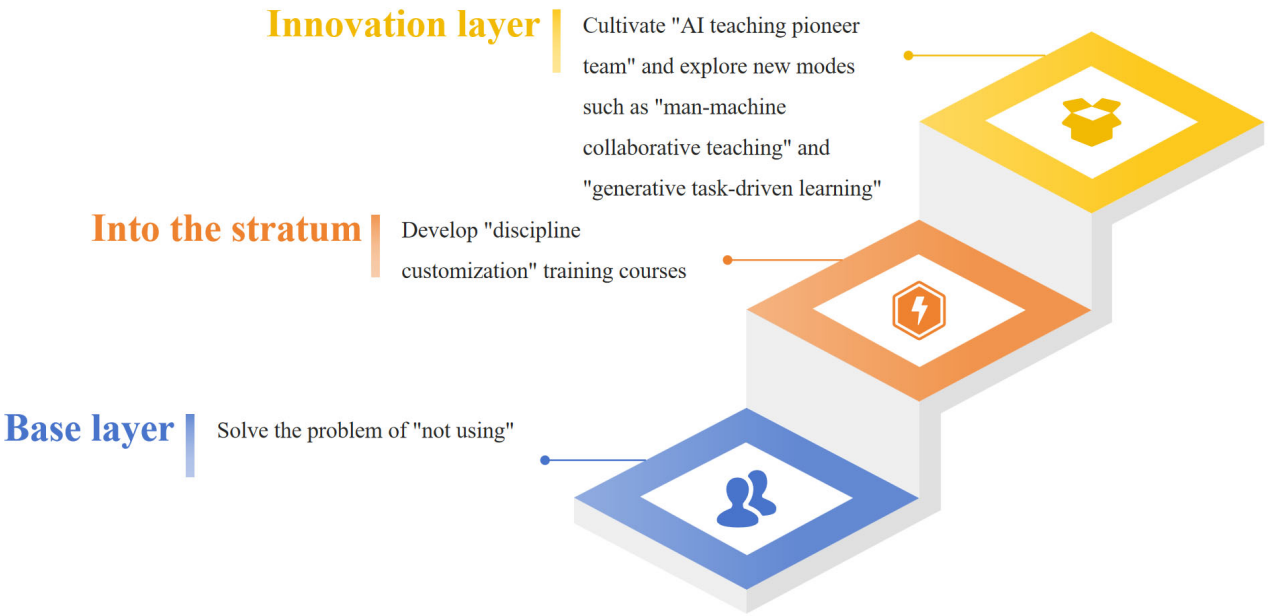

Figure 2. Three-level training system

(2) Teaching material content innovation——Dynamically generated "AI+ knowledge" new teaching material system

In view of the pain point that the update of traditional teaching materials lags behind the development of technology, a new teaching material form of "paper teaching materials+digital resources +AI generation module" is constructed. Embedding the column of "Generative AI Application Scenarios" in the textbook, and combining with the real case of Liaoning's advantageous industries, showing the process of solving practical problems with AI tools; Develop a supporting "AI dynamic resource library" and access to the mainstream generative AI platform through interfaces, allowing teachers to customize and generate expanded cases, exercises or simulated experimental data according to teaching needs; Students can call the AI assistant through the QR code of the textbook to complete the self-learning closed loop of "problem raising-scheme generation-verification optimization"; Joint industry enterprises set up a "Teaching Material Content Co-construction Committee", regularly collect the AI application requirements of the front line of the industry, dynamically adjust the technical cases and task designs in the teaching materials, and ensure that the teaching material content resonates with the regional industrial development.

(3) Innovation of teaching method model——Scene-driven personalized teaching practice of "AI+ Learning"

Focus on the "student-centered" educational concept, and use the personalized interactive ability of generative AI to reconstruct the whole process of "teaching-learning-evaluation". Through AI analysis of students' learning behavior data, an "individual learning portrait" is automatically generated, and teachers design hierarchical tasks accordingly; Design a project-based teaching mode of "AI generating problem chain", in which students cultivate critical thinking and innovative ability in the cycle of "questioning-generating-feedback" through an iterative scheme of dialogue with AI; Combining Liaoning's characteristic culture with virtual reality technology, we use generative AI to create tools such as "virtual tutor" and "historical scene simulator" to support students to explore in cross-temporal situations.

3.3. Collaborative support of system, platform and ecology

In order to ensure the path landing, it is necessary to build a "trinity" security system. Issued the Guiding Opinions on the Application of Generative AI Education and Teaching in

Universities of Liaoning Province, clarified the ethical norms of technology application, and formulated the evaluation criteria of "AI integrated into Three Teachings"; Build a provincial "generative AI education cloud platform", integrate teaching tools, resource sharing and exchange communities, and lower the threshold of technology application; Promote the university to build an "AI+ education" joint laboratory with local scientific and technological enterprises and industry associations in Liaoning, promote the accurate docking of technology supply and teaching needs, and form a joint reform force of "government guidance-university subject-enterprise participation".

4. Conclusion

There are obvious problems in the teaching staff, textbook construction and teaching methods in Liaoning, such as the lack of teachers' information literacy, the lag of textbook updating and the singleness of teaching methods. In order to solve these problems, this study puts forward the reform ecology of "technology-education" deep integration, including promoting teachers to transform into AI collaborative teaching designers, developing a new teaching material system of "AI+ knowledge" generated dynamically, and innovating AI-driven personalized teaching mode. In addition, the study also emphasized the collaborative support of system, platform and ecology, and suggested that relevant policy guidance should be issued, a provincial education cloud platform should be built, and school-enterprise cooperation should be promoted to build a joint laboratory. Through these measures, it is expected that teachers can make good use of AI to improve teaching, teaching materials are embedded in AI to reflect the frontier, and teaching methods rely on AI to stimulate innovation, providing high-quality talent support for Liaoning's comprehensive revitalization and all-round revitalization.

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