

Status and improvements of transforming scientific research achievements into teaching resources in universities

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Abstract: There are many practical difficulties in the concrete implementation of transforming scientific research results into teaching resources. Through analyzing the existing transformation forms and problems, a comprehensive transformation model is discussed, and a comprehensive evaluation system covering teachers and students is established. Establish a guarantee mechanism from multiple channels such as capital investment, system guarantee, and performance reward, escort the transformation of scientific research results into teaching resources, and promote universities to strengthen the talents training.

1. Introduction

Scientific research and teaching are the two cornerstones for the construction of "characteristic high-level majors" in colleges and universities. Scientific research is an indispensable way to improve the quality of talent training. Teaching plays a continuous role in promoting the development of scientific research^[1]. In 2019, the Ministry of Education issued the "Opinions on Deepening the Reform of Undergraduate Education and Teaching and Comprehensively Improving the Quality of Talent Training", which proposed to promote scientific research to feed back teaching, strengthen the function of scientific research in talent training, and promote universities to transform the latest scientific research achievements into teaching content in time to stimulate students' interest in professional learning.

Practically, the teaching resources transformed from teachers' scientific research achievements have become an important part of university teaching resources. Many colleges and universities have explored the path of promoting the transformation of scientific research achievements into teaching resources^[2-3]. However, there are still many difficulties in the specific implementation process. Therefore, it is necessary to strengthen the understanding from various aspects, improve the implementation path, establish the evaluation system and guarantee mechanism, and help the scientific research achievements to feed back the education and teaching, and improve the quality of talent training.

2. Main transformation forms and practical difficulties

2.1 Transformed into classroom teaching resources

The frontier content of the subject is the focus of teachers' scientific research. Therefore, integrating the latest research results into the teaching resources in an appropriate way, and setting up frontier courses in the form of professional elective courses can cultivate and enhance students' interest in professional learning. It can also publish scientific research results in the form of teaching materials and monographs to further enrich and update teaching resources^[4].

2.2 Transformed into academic competition projects

At present, colleges and universities focus more on the cultivation of innovative talents, and various subject competitions continue to heat up, which has built a good practice platform for improving college students' innovative and practical ability^[5]. In those competitions, teachers use scientific research achievements to guide students to extracurricular praxis, participate in competitions and declare projects, which can greatly enhance the innovation and practicability of the participating works, exercise students' innovative and practical ability, turn scientific and technological innovation achievements into works, practicality and even industrialization, and realize the application value of scientific research achievements.

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2.3 Transformed into thematic lectures

The thematic lecture is an important teaching content outside the classroom. In terms of the theme of the lecture, according to the characteristics of the specialty, school teachers can not only teach professional knowledge and frontiers, but also invite enterprise experts to teach industrial development and technology application^[6]. By transforming scientific research results into thematic lecture content, the depth, breadth and thickness of the lecture theme can be greatly improved, which can deepen students' professional knowledge.

2.4 Guiding graduation thesis (design)

Graduation thesis (design) is the last and most important link in the examination of teaching quality. Through the basic accumulation of the integration of research and teaching in preliminary work, students have developed a strong interest in scientific research and have a certain ability of innovation and practice. In the selection of graduation thesis (design) topics, the combination of scientific research results and graduation thesis topics can effectively improve the quality of students' graduation thesis (design)^[7]. Under the guidance of teacher, students carry out literature collection and collation, write research plans, design experimental programs, draw design drawings, write papers, and finally complete their graduation thesis (design). In this process, the practical innovation ability and research methods have been improved, and the scientific research achievements have played an important role in driving teaching.

In the specific implementation process of the above-mentioned multi-path transformation, there are many practical difficulties: First, the school does not attach enough importance to it, and the policy support is insufficient. At present, the output of scientific research achievements is still an important indicator for evaluating universities. There is no evaluation system for the transformation of scientific research outputs into teaching resources, and there is a lack of capital investment^[8]. Second, there is a lack of corresponding incentive mechanism for teachers. At present, colleges and universities link the promotion and evaluation of teachers' titles are mostly linked to scientific research achievements, and lack of policy support for the transformation of scientific research outputs into teaching resources. Some colleges and universities have even set up teaching posts and scientific research posts, which completely separate scientific research from teaching, resulting in the general emphasis on scientific research and light teaching among college teachers, and insufficient attention to the transformation of scientific research achievements into teaching resources. Third, students' participation is not high. Due to factors such as heavy schoolwork or too boring scientific research, students lack interest in scientific research projects. Despite repeated publicity and encouragement by teachers, it is still difficult to enhance students'

enthusiasm for participation.

3. Major improving countermeasures

3.1 Optimize the transformation path

Different types of scientific research achievements show diversity and complexity, and teaching resources in different links show differences^[9]. It is necessary to reasonably match the two, and establish a comprehensive transformation model based on students' professional knowledge structure and personalized characteristics.

According to the characteristics of different scientific research achievements, combined with teaching link's needs, establish a "five in one" all-round transformation model of scientific research outputs into classroom teaching content, scientific research achievements into experimental projects, scientific research achievements into graduation design topics, scientific research achievements into innovation and entrepreneurship activities and scientific research achievements into academic lectures, show as figure 1. On this basis, the characteristics of each transformation form and the corresponding relationship between the transformed teaching resources and the graduates' ability requirements are analyzed. Combined with the students' knowledge structure and personalized characteristics, the characteristics of each transformation form are analyzed to further improve the transformation mode.

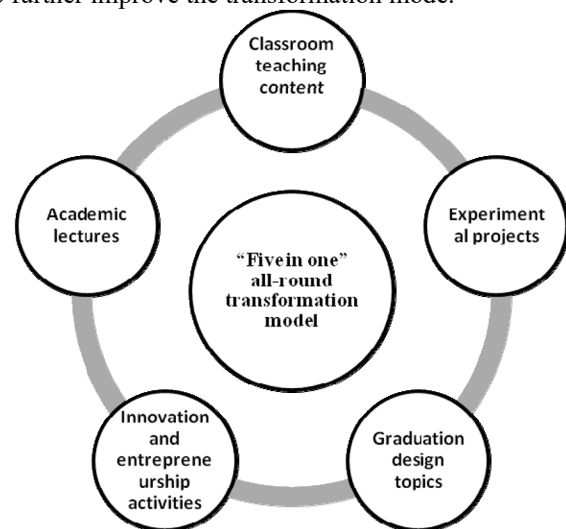


Fig. 1. "Five in one" all-round transformation model

3.2 Establish the evaluation system of transformation

The improvement of talent training quality is the key index to evaluate the effectiveness of transformation. Therefore, we should focus on talent training and teacher development, and build an evaluation mechanism with the participation of students, teachers, schools, experts, enterprises and other multiple subjects^[10].

In terms of teacher evaluation, the quality of talent training and teaching quality are included in the

evaluation criteria of scientific research work, and an evaluation system integrating teaching and scientific research is formulated. In this process, we try to quantify the corresponding indicators of each link, and adopt a comprehensive assessment and evaluation method combining qualitative and quantitative, subjective and objective, so as to reduce the subjective arbitrariness of evaluation. In addition, the evaluation should comprehensively consider the transformation form and transformation effect, and give different weights to different transformation forms. According to the quantity of scientific research achievements entering classroom teaching, experimental teaching, the quantity of special lectures, the awards of competitions, and the guidance of graduation design, different scores are given. In the evaluation of professional and technical titles, the evaluation of teaching resources transformed by scientific research results is carried out, including quantity evaluation of results, teaching effect evaluation, student evaluation and representative evaluation.

In terms of student evaluation, the evaluation criteria combining theory and practice are emphasized, and the whole process of student training is included in the evaluation content of teaching resources transformed from scientific research results, including course learning, course design, professional practice, discipline competition, experiment report, graduation thesis (design), employment and other aspects. In terms of evaluation methods, various combination evaluation methods such as project defense, mid-term assessment, practical assessment and final examination are adopted^[11].

3.3 Establish a guarantee mechanism of transformation

In the transforming process, a corresponding guarantee mechanism should be provided to form a good atmosphere of mutual promotion of science and education^[12].

(1) Raise awareness and strengthen attention. Colleges and universities should strengthen the degree of emphasis on the scientific research results back-feeding teaching resources, clarify the educational concept of science and education integration, collaborative education, and take the initiative to promote the mutual promotion of scientific research and teaching in universities.

(2) Provide financial support. teachers should have both work time and energy investment, but also need some financial support in the process. If there is no strong external promotion, the effect of transformation will be greatly reduced. Therefore, colleges and universities can increase the number of conversion projects in the application of various projects, increase the amount of funding, and can also set up special working funds to provide adequate funding guarantee.

(3) Improving the institutional system. Up to now, a perfect system for encouraging teaching and scientific research have developed in many universities, but the

two are almost parallel to each other. So, it is indispensable to integrate scientific research into teaching resources with the current education system, formulate corresponding rules and regulations according to the content, quantity and results of scientific research into teaching resources, and make the transformation work follow rules from the institutional level.

(4) Establish an incentive mechanism. For the teachers, encourage teachers to involve undergraduates in research activities, reward scientific research achievements to promote subject competition projects, encourage teachers to guide students to achieve scientific research innovation, and reward scientific research innovation paper topics through paper evaluation. Integrated scientific research achievements transformed into teaching resources into the teacher evaluation system, through the incentive system combining material rewards and spiritual rewards, give full play to the positive guiding role of scientific research in teaching.

As for students, on the one hand, targeted work should be carried out according to the characteristics of different grades of undergraduates. Freshmen are full of freshness and curiosity about everything when they first enter universities. At this time, more publicity should be carried out to attract their attention. For senior students with certain basic professional knowledge and skills, they are actively encouraged to join the scientific research project in the form of a team, set up a project study group, and arrange to read literature, process experimental data, write reports, publish papers and other scientific research work. On the other hand, it is suggested to improve the management system of undergraduate awards and grants, and incorporate students' participation in scientific research into the system of awards and grants, so as to form a good operating mechanism for students' participation in scientific research.

4. Conclusion

The most important responsibility of universities is to cultivate talents. Universities should carry out the fundamental task of cultivating talents by virtue and adhering to the three aspects of education. Universities are required to establish a mechanism of collaborative education in science and education, form a "five-in-one" all-round transformation mode, optimize talent training programs, strengthen top-level design and resource integration. Establish a long-term model for teachers and students to participate in scientific research activities. Establish a scientific comprehensive evaluation system, encourage teachers to transform scientific research results into teaching resources, form a good model of two-way interaction between science and education, enhance students' interest in participating in scientific research, and focus on cultivating students' innovative practical ability. Through raising awareness, capital investment, system guarantee, performance reward and other channels to establish a guarantee mechanism for the transformation of scientific research results into

teaching resources. The transformation of scientific research results into teaching resources is conducive to improving the scientific level and application value of scientific research results themselves, and is conducive to strengthening the training of high-quality innovative talents in colleges and universities. It is a breakthrough point for colleges and universities to improve teaching quality and is worth exploring.

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