Research on the Evaluation System of Diversified Comprehensive Quality of Graduate Students Majoring in Materials Under the Background of "Double First-Class" Construction

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Abstract. The current comprehensive quality evaluation system of graduate students in materials field has some problems, such as insufficient dynamic adjustment of evaluation index, undiversified evaluation subject, insufficient result analysis and feedback. The works in this paper are guided by the requirements of talent training under the background of "Double first-class" construction. The construction of the diversified comprehensive quality evaluation system for graduate students major in materials is realized by the diversification of evaluation elements and evaluation subjects, and the establishment of feedback mechanism. The paper focuses on the reconstruction of the evaluation method of scientific research literacy, the evaluation idea mainly based on the research progress, quality and extension results of the dissertation. The "representative work system" is proposed to encourage the graduate students to deepen the research connotation, improve research ability, and pay more attention to the depth and quality of the research. In order to adapt to the rapid expansion of application-oriented graduate training scale, a practical ability evaluation system composed of patent, practice, school-enterprise project, innovation and entrepreneurship competition is designed. The purpose of the relevant work is to guide the graduate students to pay attention to the depth and quality of research, and effectively improve their research quality.

Keywords: "Double first-class" construction · Graduate student in materials major · Comprehensive quality evaluation system

1 Introduction

According to the "Overall Plan for Promoting the Construction of world-class universities and Disciplines" issued by The State Council, the task requirements of "Double first-class" that the number and strength of first-class universities and disciplines should enter the forefront of the world. Material science is important for national economic construction [1]. With the development of network information and artificial intelligence technology, the talent training mode of material majors should conform to the

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development of the times. However, most current domestic researches on postgraduate education are focusing on the reform and innovation of talent training mode [2]. There are few reports on the research of talent comprehensive quality evaluation system.

Under the background of "Double first-class" construction, this paper expounds the construction ideas of the diversified comprehensive quality evaluation system of graduate students in materials major through investigation and analysis of research situation of comprehensive quality evaluation of graduate students, combined with the characteristics of postgraduate training in materials subject.

2 Current Research on the Comprehensive Quality Evaluation System of Postgraduates

Foreign graduate students' comprehensive quality evaluations are strict monitoring the training process. They paying attention to the investigation of independent research ability and innovation ability and carrying out large-scale quality evaluation of graduate students training on a regular basis [3–5], as following examples. In the United States, most colleges and universities pay more attention on qualification examination and experts' evaluation of graduate students' real scientific research accomplishment. The system mainly includes courses, qualification examination, practice, paper quality. In the UK, evaluation focuses on graduates' independent research, literature review, innovation, thesis process, etc. In Germany, postgraduate education is based on "apprenticeship" and courses are mainly self-taught, so the evaluation system weakens the academic performance, but independent research ability and working ability of postgraduate students are very strict required. In Japan, the evaluation attaches particular importance to course study, independent research, dissertation and innovative research.

In recent years, the evaluation system of domestic colleges has realized the transformation from the study-oriented to the comprehensive evaluation of multiple factors. It pays more attention to the comprehensive evaluation of moral, learning, scientific research and practical ability. It quantifies the achievements of graduate students with unified standards and takes the total score of weighted sum [6–10], as following examples. Tsinghua University establishes the evaluation system based on the principles of paying more attention on moral education, academic achievement, classification coverage, scientific orientation, level coordination, appropriate proportion, easy assessment and matching bonus to guide the development of expertise. Tongji University developed an evaluation system of talent quality based on fuzzy mathematics which guided by 32 detailed evaluation indexes dominated by knowledge, ability and personality. Xidian University establishes a database of academic achievements to reflect the quality of training and shortcomings through the big data of achievements and to improve academic evaluation.

3 Investigation on the Comprehensive Quality Evaluation System of Postgraduates

This research studied the comprehensive quality evaluation system of graduate students majoring in materials in representative universities around the province by means of investigation and questionnaire survey. At present, the evaluation of graduate students

majoring in materials in universities is mainly based on the evaluation of candidates for various campus awards and awards set up by superior departments. The problems of this system have gradually emerged:

Firstly, the comprehensive quality evaluation of postgraduates is still dominated by the terminal evaluation and academic. The thesis published during postgraduate study is also an important basis for comprehensive quality evaluation. It plays a good guiding role in the initial stage of implementation and promotes the centralized emergence of academic achievements. But, the improvement of graduate students' research ability and the retention rate of academic achievements have led to intense competition for awards.

Secondly, compared with the "Double first-class" construction of the higher requirements of the evaluation subject composition is relatively simple. At present, the subject of postgraduate evaluation is still teachers without comprehensive consideration of ideological quality, team service, daily performance, opinions of employers. However, teachers can only evaluate graduate students according to their usual academic performance, paper publication, project participation and awards.

Thirdly, the feedback effect of evaluation result is neglected during the evaluation activities. At present, the evaluation of graduate students usually ends when the total score of quantitative weighted sum are obtained. These works lack of overall analysis and feedback on the evaluation results. Teachers and managers can't timely modify the cultivating model according to the feedback results.

4 Construction of Diversified Comprehensive Quality Evaluation System for Graduate Students

This paper takes the comprehensive quality evaluation system of material science graduate students under the background of "double first-class" as the research theme. The evaluation criteria, evaluation mode, data analysis and feedback mode are optimized and improved as shown in Fig. 1. While ensuring scientific evaluation and guiding the development of expertise, encouraging the overall promotion of postgraduates.

4.1 Diversification of Evaluation Factors

Focusing on the fundamental task of "cultivating morality and cultivating people" and constructing the evaluation system with ideology and morality, learning ability and scientific research quality as the main elements. Taking ideological and moral quality as the foundation and attaching importance to the multi-evaluation of ideological and moral, academic works and public service. On basis of the course performance evaluation, the learning ability is evaluated by the political theory learning of the media and the participation in academic lectures. The evaluation of scientific research innovation literacy is carried out with independent research ability and effectiveness as the leading role, and relevant indicators of application innovation, engineering practice and academic exchange ability are added to meet the training objectives of application-oriented graduate students.

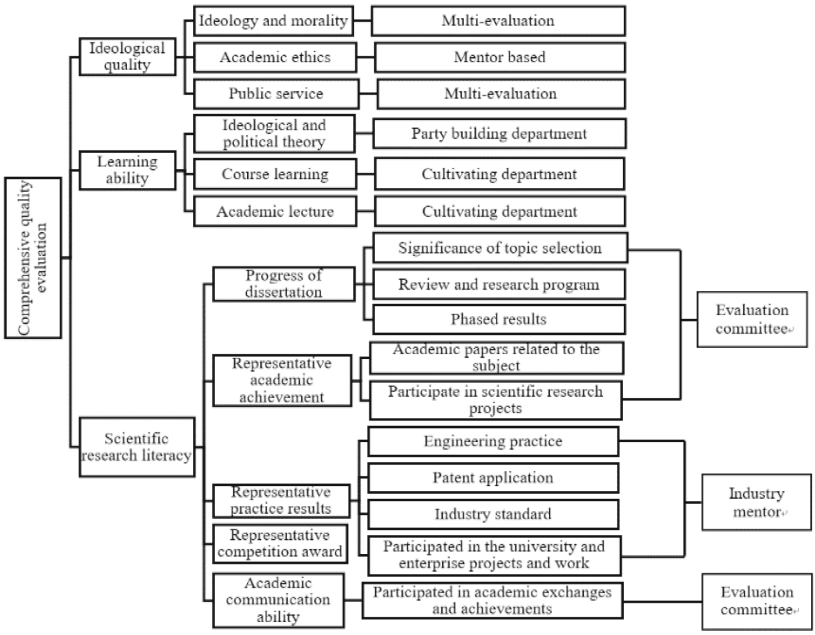

Fig. 1. Schematic diagram of postgraduate comprehensive evaluation system

4.2 Diversification of Evaluation Subjects

Optimizing the staff structure of the evaluation committee which covers departments, disciplines, cross-disciplines, ideology and politics, professions, industries, and daily management. The index of moral education is evaluated by the person in charge of each field, the supervisor, the student administrator and graduate student. The relevant evaluation system is established in accordance with the evaluation activities of key stages, such as academic scholarship, national scholarship and outstanding dissertation. The comprehensive quality evaluation group of graduate students is constructed which is composed of the dean, the deputy dean in charge of graduate students, the supervisor, the industry supervisor, the cross-disciplinary supervisor, the deputy secretary in charge of student work, the graduate student counselor, the graduate student, etc. A series of evaluation system is established to clarify the contents and methods of evaluation and the division of responsibilities of each part, such as the collection and sorting of evaluation data.

4.3 Diversification of Evaluation Methods of Scientific Research Literacy

Adopting the mode of "quantitative scoring" combined with expert evaluation and invite external enterprise mentors of practical ability evaluation for engineering practice and application practice results evaluation to optimize the evaluation mode of scientific research literacy. Constructing the "representative system" research achievement evaluation model, which is dominated by the progress and effectiveness of dissertation and

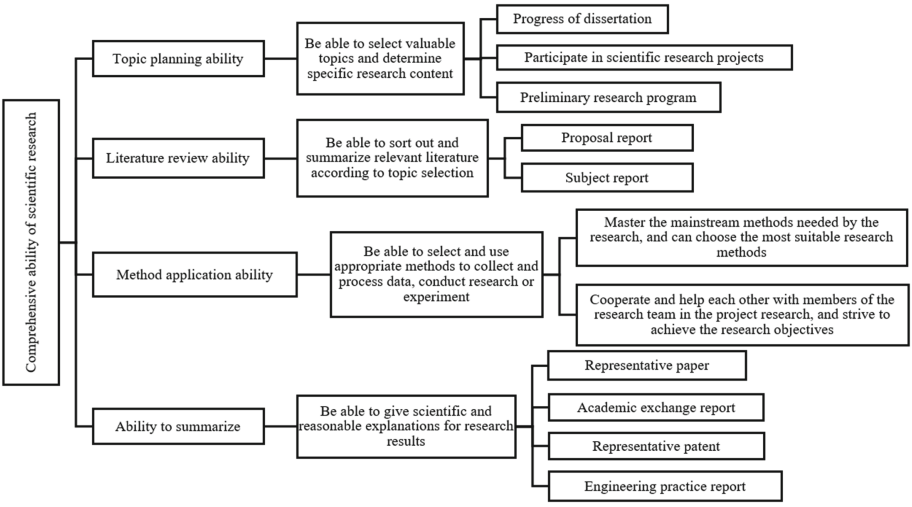

Fig. 2. Schematic diagram of scientific research literacy evaluation system

referred to the extended academic achievements, attaches importance to the investigation of the practical independent research ability of graduate students as shown in Fig. 2.

4.4 Establish an Analysis and Feedback Mechanism for Evaluation Results

Optimizing the collection method of comprehensive quality evaluation information, and simplify the filling of relevant application forms with the help of retrieval systems. Realizing the efficient collection of comprehensive quality data. After the completion of the evaluation work, make the relevant evaluation results analysis brief, timely feedback, comments and suggestions. Making full use of information technologies such as Internet, cloud computing and big data to collect information about the source of graduate students, the training process and the admission and employment process of graduate students.

5 Conclusion

The evaluation system has been practiced in the training of 70 postgraduates in the material discipline of Harbin Institute of Technology (Weihai). Recent years, the graduate students have participated in more than 50 scientific projects, published more than 40 research papers, applied for more than 30 patents, participated in more than 30 school-enterprise engineering projects, and won more than 20 awards of various innovation competitions. By setting corresponding elements and inviting relevant persons participate the evaluation, graduate students are guided to pay attention to the improvement of their learning level of political theory, consciousness of social responsibility and ideological and moral cultivation. Reconstructing the evaluation factors of scientific research literacy and establishing the important role of research progress, quality and

extension results in reflecting individual's independent research and innovation ability. Establishing an analysis and feedback mechanism of evaluation results, fully explore the feedback and guidance function of comprehensive evaluation, guide teachers and students to reflect and improve, and promote the overall improvement of postgraduate training quality.

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References

1. Y.R. Zhu, Research on Quality Evaluation System of material Graduate Training under the background of "Double First-class" construction, Heilongjiang Human Resources and So-cial Security, 2021(21):13-15.
2. M. Huo, Problems and Thoughts on the Evaluation of Ability and Quality in the Evaluation of Comprehensive Quality of Postgraduates, Science and Education Guide, 2018(34):53–54+61.
3. X.L. Xiong, J.M. Tan, Construction of evaluation system for core scientific research literacy of postgraduates, Teaching and Educating (Higher Education Forum), 2021(30):16-20.
4. C.T. Lin, P. Wang, Z. F. Li, The Constitution and Practice of Graduate Honor System -- Taking Tsinghua University as an example, Degrees and Graduate Education, 2013(04):37-40.
5. S. Y. Hong, C. Yang, S. T. Ye, S. H. Chen, Fusion Evaluation of College Cultivation by Adaptive Multivariate Neural Network Model, Computational Intelligence and Neuroscience, 2022,08:1-10.
6. Y. X. Liu, Z. R. Fan, Y.X. Gu, C. W. Xv, W. Y. Niu, Research on Quality Evaluation System of postgraduate Education based on degree type, University Education,2020(02):53-55.
7. Y. X. Liu, Z. R. Fan, Y.X. Gu, C. W. Xv, W. Y. Niu, Research on Quality Evaluation Sys-tem of postgraduate Education based on degree type, University Education,2020(02):53-55.
8. H. Z. Xv, J. Y. Zhao, Research on the construction path of value-added evaluation system of postgraduate studies, University, 2022(31):50-53.
9. F. Xve, Q. Q. Li, Research on the Construction of mentoring Mode and evaluation of comprehensive mentoring ability of graduate Tutors based on NVivo qualitative analysis, Heilongjiang Researches on Higher Education, 2022,40(05):107-114.
10. K. Yang, Research on the diversified evaluation system of graduate students based on Big data of academic achievements -- A case study of Xidian University, Knowledge and Economy, 2020(13):162+164.