Evaluation methods for graduation requirements under the background of teacher education professional certification

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Abstract: The basic concept of teacher education professional certification is "students-centered, export-oriented, and continuous improvement". The evaluation of graduation requirements strictly controls the "export" of higher teacher education, which is a key link in teacher education professional certification. It is an important guarantee for deepening the reform of the evaluation system of higher teacher education and improving the training quality of normal students. Comprehensive and objective evaluation results provide important basis for continuous improvement of the teacher education professional training system. The evaluation of the graduation requirements for teacher education majors involves various aspects of training teacher education student, which is a closed-loop system, including evaluable and testable indicator systems, reliable evaluation criteria, reasonable evaluation methods, timely feedback, and continuous improvement.

Keywords: Evaluation, graduation requirements, teacher education professional certification

1. Introduction

Education is the foundation of a century long plan, and high-quality teachers are a necessary condition for doing a good job in education. Teacher education aims to cultivate teachers and serves as the mother-machine for the education industry. How to cultivate this mother-machine well, build a new era of teacher education and training system, and continuously improve the training quality of normal students is an important issue in current educational research [1]. To standardize and guide the construction of teacher education majors, establish and improve the quality assurance system of teacher education, and continuously improve the quality of teacher training, the Ministry of Education issued the "Interim Measures for the Certification of Teacher Education Majors in Ordinary Higher Education Institutions" in 2017, marking the beginning of the certification work for teacher education majors in ordinary higher education institutions [2]. The certification of teacher education majors is based on the basic concept of "student-centered, export-oriented, and continuous improvement". It is an external evaluation of the quality of talent cultivation in teacher education majors, promoting the connotative development of teacher education majors, and ensuring that teacher graduates meet certain knowledge, skills, and quality standards. The certification of teacher education majors is based on the basic concept of "student-centered, export-oriented, and continuous improvement". It is an external evaluation of the quality of talent cultivation in teacher education majors, promoting the connotative development of teacher education majors, and ensuring that teacher graduates meet certain knowledge, skills, and quality standards. The certification standards for teacher education majors propose 8 graduation requirements, which stipulate the basic "export" specifications for teacher education graduates [3]. The evaluation for the achievement of graduation requirements is a key link in the certification of teacher education majors, and is a necessary condition for the continuous improvement of the teacher education system and the improvement of the quality of teacher education [4]. There are many scheme to address this problem [5-6]. Therefore, this article studies the evaluation method for the achievement of graduation requirements of teacher education majors from a practical perspective.

2. Evaluation mechanism for achieving graduation requirements

The evaluation for achieving graduation requirements of teacher education majors is a systematic project that involves various aspects of training teacher education student. Firstly, there should be an

evaluable and testable indicator system, reliable evaluation basis, and reasonable evaluation methods. Then, timely feedback should be provided to guide the continuous improvement of the training system of teacher education majors.

1) Evaluation organization. The evaluation organization should establish a teacher education and teaching evaluation working group under the leadership of the college's teaching guidance committee, with the director of the teaching guidance committee serving as the group leader, and the vice dean of teaching, the head of the mathematics department, the professional leader, the course group leader, external teachers, and backbone teachers participating in the evaluation.

2) Evaluating indicator. Based on the training objectives of this major and in accordance with the principles of feasibility and evaluability, the 8 graduation requirements in the teacher training professional certification standards are decomposed into more specific graduation requirement indicator points, combined with the characteristics of mathematics and applied mathematics majors. Each indicator point is supported by several teaching links.

3) Evaluation object and period. To comprehensively reflect the achievement of graduation requirements, timely identify problems in the training process of teachers, and continuously improve the training quality of teachers, the evaluation targets should be all fresh graduates, with an evaluation period of one year, conducted after graduation defense.

4) Evaluation method. The graduation requirements of this major are evaluated using a comprehensive evaluation method that combines course assessment (objective) and graduate self-evaluation (subjective), with assessment as the main approach and graduate self-evaluation as a supplement.

5) Evaluation basis. The evaluation of graduation requirements is based on the course assessment results and questionnaire survey results. The evaluation is based on teaching activities such as final exam papers, grading standards, process exams, daily assignments, classroom performance, experimental reports (knowledge summaries), chapter tests, and survey questionnaires.

6) Feedback on evaluation results. The teacher education teaching evaluation group writes a graduation requirement evaluation report based on the evaluation results, pointing out the problems that exist in the training process of teacher education students and providing corresponding improvement suggestions. The College Teaching Guidance Committee reviews the evaluation report and organizes the implementation of graduation requirements and continuous improvement of corresponding teaching processes.

3. Evaluation process for achieving graduation requirements

The evaluation for achieving graduation requirements is based on the course assessment scores of fresh graduates and the self-evaluation scores of students; The course assessment scores are obtained by the course team based on the corresponding relationship between teaching content and course objectives. The self-evaluation scores of students are collected through the distribution of graduation requirement achievement survey questionnaires. The evaluation process is shown in Figure 1.
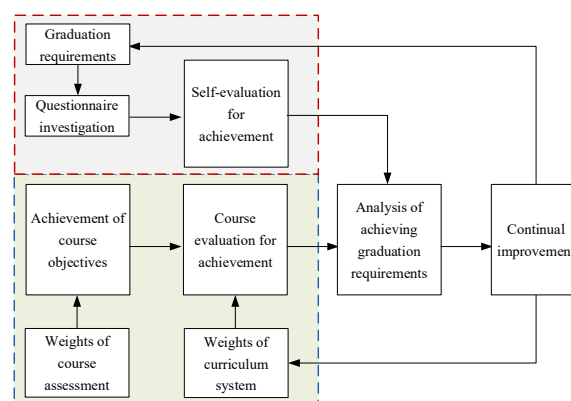

Figure 1: The evaluation process for achieving graduation requirements.

1) Data collection. The course assessment score data includes process assessment data and final assessment data. These data with corresponding supporting materials is provided by teachers. The evaluation team determines the corresponding support weights based on the support relationship between the assessment content and the course objectives, as well as the support relationship between the course objectives and graduation requirements; The self-evaluation score data of fresh graduates is obtained through a survey questionnaire by the full-time teachers of the curriculum team and the student office, then summarized and provided.

2) Organizational review. The Teaching Guidance Committee organizes and evaluates the rationality of the evaluation institution, the reliability of basic data, the authenticity of evaluation criteria, the comprehensiveness of evaluation content, and the scientificity of evaluation methods.

3) Calculation the degree of course goal achievement. The degree of achievement of course objectives is the fundamental link in the evaluation of graduation requirements. According to the characteristics of the course, a classification evaluation method is implemented. That is, subject courses focus on theoretical assessment, both theoretical and practical assessments are emphasized in teacher education courses, while practical courses focus on assessing practical abilities. The achievement of course objectives is calculated based on the following formula,

$$c_j = \frac{\sum_{i=1}^{N} \frac{k_{ij}\overline{t_i}}{g_i}}{\sum_{i=1}^{N} k_{ij}} \tag{1}$$

where c_j is the degree of achievement of the jth course objective, t_i is the grade achieved by student in the ith course assessment stage, $\overline{t_i}$ is the average score achieved by all students in the ith course assessment stage, g_i is the corresponding full score value, k_{ij} is the supporting weight of the ith course assessment stage on the jth course objective.

4) Evaluate the achievement degree of graduation requirements. The graduation requirements of this major are evaluated using a comprehensive evaluation method that combines course assessment and graduate self-evaluation, with assessment as the main approach and graduate self-evaluation as a supplement.

(1)Course assessment and evaluation. Firstly, calculate the course achievement based on the achievement of course objectives as follows.

$$cr_k = \sum_{j=1}^{p} \hat{w}_{kj} c_{kj} \tag{2}$$

where cr_k is the degree of achievement of the kth course, c_{kj} is the degree of achievement of the jth objective of the kth course, $\hat{w}_{kj}$ the supporting weight of the jth objective on the kth course.

Then, based on the support relationship between the supporting courses and the graduation requirement indicators, calculate the degree of achievement of the graduation requirement indicators as follows.

$$gr_{ij}^1 = \sum_{k=1}^{q_i} w_{kj}^i cr_k \tag{3}$$

$$w_{kj}^i = \frac{I_{kj}^i}{\sum_{t=1}^{q_i} I_{tj}^i} \tag{4}$$

$$I_{kj}^i = \begin{cases} 3 & \text{High support (H)} \\ 2 & \text{Medium support(M)} \\ 1 & \text{Low support(L)} \end{cases} \tag{5}$$

where gr_{ij}^1 is the achievement degree of the jth indicator point of the ith graduation requirement based on course assessment, w_{kj}^i the supporting weight of the kth course on the jth indicator point, q_i^j the number of courses supported by the jth indicator point of the ith graduation requirement.

(2)Graduate self-evaluation.

Firstly, design a self-evaluation questionnaire based on the indicators of graduation requirements, with a total of 20 items. Each item is divided into 5 levels, corresponding to 5, 4, 3, 2, and 1. Graduates will score themselves based on their own achievement, with higher scores indicating better achievement degree.

Then, based on the self-evaluation of graduates, calculate the degree of achievement of graduation requirements indicators as follows,

$$gr_{ij}^2 = \frac{1}{5M}\sum_{k=1}^{M}\tau_{ij}^k \tag{6}$$

where gr_{ij}^2 is the achievement degree of the jth indicator point of the ith graduation requirement based on the self-evaluation of graduates, M is the number of students participating in the evaluation, τ_{ij}^k is the value of self-evaluation on the jth indicator point of the ith graduation requirement.

Finally, calculate the degree of achievement of graduation requirements indicators and conduct an analysis of the achievement of graduation requirements as follows.

$$gr_{ij} = agr_{ij}^1 + (1-a)gr_{ij}^2 \tag{7}$$

$$gr_i = min\{gr_{ij}, j = 1, 2, \cdots, m_i\} \tag{8}$$

where gr_{ij} is the achievement of the jth indicator point of the ith graduation requirement, a is a factor to balance subjective and objective evaluation, gr_i is the achievement of the ith graduation requirement, m_i is the number of indicator points of the ith graduation requirement. Then give the achievement as follows,

$$Achievement = \begin{cases} 1 & gr_i \geq \sigma_i \\ 0 & gr_i < \sigma_i \end{cases} \tag{9}$$

where 1 represents success and 0 represents failure.

5) Feedback on evaluation results. The Teacher Education Professional Education and Teaching Evaluation Working Group, in conjunction with the curriculum team and key teachers, identifies issues and proposes improvement suggestions based on the evaluation results, forms an evaluation report. Then, the Teaching Guidance Committee reviews this report and organizes the implementation of continuous improvement of the training system.

4. Conclusion

The evaluation of graduation requirements is an important link in the certification of teacher education majors, providing a reliable basis for the continuous improvement of the teacher education student training system. This article analyzes the evaluation mechanism and process for achieving the graduation requirements of normal majors, providing evaluation institutions, evaluation content, evaluation basis, data collection, evaluation methods, and evaluation process, forming a complete evaluation system for the graduation requirements of normal majors, providing reference for the construction of normal majors.

Acknowledgements

References

[1] Sun, W. H., Wang, G. D., Tian, M., Geng H.L., (2019) Exploring the Construction of Mathematics Majors from the Perspective of Teacher Education Professional Certification. Journal of Higher Education, 6, 99-101.

[2] Luo L., Song J., Wu S. L., Liu L., (2020) Research and Practice on the Evaluation Method of Graduation Requirement Achievement Based on Teacher Education Certification Standards, Journal of Higher Education, 33, 103-109.

[3] Zhou X. J., He J. J., (2020) Certification of Teacher Education Majors in China: From Concept to Practice, Jiangsu Higher Education, 2, 72-77.

[4] Tian T. F., (2020) Evaluating the Training Quality of Normal Students, Journal of Teacher Education, 7(4), 79-86.

[5] Li J., Hou X. Q., (2023) Calculation of the degree of achievement of course objectives and graduation requirements in teacher education professional certification, Journal of Higher Education, 3, 57-61.

[6] Li J. L., Zheng J. H., Liu Y. W., (2022) Evaluation of Course Goal Achievement under the Background of Teacher Education Professional Certification: Theoretical Explanation and Implementation Strategies, Journal of Higher Education, 33, 102-105.