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Research on the Construction of Evaluation Indicators System of Pre-Service Teachers' Teaching Competency in Special Delivery Classroom

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Abstract: "Internet plus" pre-service teachers teaching-assistance is a new model of Internet-based education service proposed under the background of education informatization 2.0. At present, the *"Internet plus" Teaching-assistance Service Project for Normal College* has been implemented for two years as the breakthrough project for the director of *Gansu Provincial Department of Education*. However, with the deepening of the project, how to effectively evaluate the pre-service teachers' teaching competency of special delivery classroom has become a key issue. Based on this, the research focuses on providing scientific, effective and applicable tools and methods for the evaluation of teaching competency of pre-service teachers' in special delivery classroom. By comprehensively using the Literature Research Method, Delphi Method, Analytic Hierarchy Process (AHP) and Investigation Research Method, the evaluation indicators system of pre-service teachers' teaching competency in special delivery classroom with weight is constructed, It includes 5 first-level indicators, 12 second-level indicators and 36 third-level indicators. Which solves the key question of "what evaluation should be used?" The results show that the theoretically constructed evaluation indicators system has relatively comprehensive indicators, relatively reasonable weights, and strong applicability, and can objectively, comprehensively, fairly and justly evaluate the teaching competency of pre-service teachers in special delivery classroom.

Keywords: Special delivery classroom, pre-service teachers' teaching competency, evaluation indicators system

1. Introduction

Special delivery classroom has become one of the normal application ways to solve the teaching problems in rural small-scale schools, but it also puts forward new challenges for teachers. Combing and analyzing the projects that have been practiced at present, it is found that the teaching effect and quality are poor and can not be carried out sustainably for a long time due to the heavy task and low participation of teachers. "Internet plus" pre-service teachers teaching-assistance is mainly taught by pre-service teachers in normal schools after educational practice, and specialized classes for rural small-scale school students through special delivery classroom. It not only effectively cracked the difficulties in offering courses in the state, but also broadened the channels for pre-service teachers' education practice, and promoted their teaching competency to progressively improve (Guo, 2020). Put forward the "Gansu Program" to promote the balanced development of high quality education.

Therefore, according to the practical demands, trying to construct an evaluation indicators system that can be used to evaluate the pre service teachers' teaching competency of special delivery classroom is very necessary and has important practical significance and value. Based on the above analysis, the core issues of research is put forward: how to construct a scientific and reasonable evaluation indicators system? Around the core issues, we need to solve the following specific issues:

1. How to determine the evaluation dimensions and indicators?
2. How to determine the importance of indicators?

2. Related Literature and Theoretical Foundations

2.1 Overview of Special Delivery Classroom

Professor Wang J's team started to carry out the "Internet plus" teaching site Hubei action in 2014, proposed "Internet plus" localized classrooms (Wang, J. 2016). Built a central school with M teaching sites (M is generally takes the value between 1 to 3) N (1+M) model of N localized teaching communities, which "synchronized interactive delivery classroom" is one of the specific teaching models (Tian, 2019). Lei L and Zuo M constructed structural framework of synchronous interactive hybrid classroom teaching model for rural teaching sites (Lei, 2015). Shen J, Guo S and other scholars designed a special delivery classroom teaching model based on a broadband satellite network environment and carried out practical applications (Guo, 2020). In addition, a large number of domestic education and training institutions and non-profit organizations have applied special delivery classroom teaching model extensively.

In addition, foreign studies similar to special delivery classroom mainly include: based on the analysis of the history of distance education in primary and secondary schools in North America, Michael Barbour proposed methods and ways to explore the construction of rural virtual schools from the perspective of online learning, hoping to improve the quality of rural school education. (Barbour, 2011). Alabama has built an online and interactive video system linking teachers and students across the state. Summerdale School uses online synchronous or asynchronous classes to realize that teachers can remotely teach students from remote rural teaching sites in the central school, which is a typical representative (Wang, X. 2016).

In summary, although there are many research results in the application model of special delivery classroom, they mainly focus on the teaching model, interactive behavior, problem analysis, optimization strategy, influencing factors and effect evaluation. However, the research on the teaching competency under the technical environment of special delivery classroom is relatively weak.

2.2 Overview of Pre-Service Teachers' Teaching Competency Evaluation Indicators System

In order to diagnose the level of pre-service teachers teaching competency, a diagnostic tool corresponding to the *"Pre-service Teacher Informatization Teaching Competency Standards"* is developed, which is proved to has good reliability and validity through multiple rounds of iterations. It is the main tool for the evaluation of pre-service teachers' informatization teaching competency in China (Yan, 2015).

In recent years, researchers have begun to pay attention to the evaluation of pre-service teachers' teaching competency. Different scholars have discussed the evaluation indicator system of pre-service teachers' teaching competency from different perspectives. By analyzing the teaching process of pre-service teachers, Han G has constructed the evaluation indicators system of pre-service teachers teaching competency through expert evaluation and self-evaluation (Han, 2011). Wang H used the literature research method to construct an evaluation system of physics pre-service teachers' teaching skills and applied the evaluation system in practice by issuing questionnaires (Wang, H. 2015). Pu C constructed the evaluation indicators system of pre-service teacher teaching competency, obtained the optimal weight coefficient based on game theory to combine weighting, and carry out empirical research to verify its effectiveness (Pu, 2019). In addition, edTPA is a typical pre-service teacher's teaching competency evaluation system, which comprehensively evaluates the teaching plans, teaching reflections, teaching videos, so as to reflect the level of competency (American Association of Colleges for Teacher Education, 2014).

To sum up, most of the existing evaluation indicators system are formulated according to relevant standards, but there are still some shortcomings. For example, some studies are relatively simple in the selection and extraction of indicators and the calculation methods of weights, and some studies only construct the evaluation indicators system at the theoretical level, but do not verify its rationality and effectiveness. The direct selection of samples for actual evaluation application cannot guarantee the reliability and validity of the research. In addition, the research on the teaching competency evaluation indicators system mainly focuses on in-service teachers, and the research results on pre-service teachers are relatively weak.

3. Methods and Procedures

3.1 Literature Research Method

This study mainly uses the literature research method to understand and master the relevant research results and materials on the special delivery classroom, and pre-service teachers' teaching competency evaluation indicators system at home and abroad. so as to find the entry point and reference basis for establishing evaluation indicators at all levels and preliminarily drafting the pre-service teachers' teaching competency evaluation indicators system.

3.2 Delphi Method

Delphi Method mainly solicits the opinions of experts in the field by preparing a questionnaire. After repeated letters and feedback, the evaluation index system is iteratively revised. Finally, the opinions of experts gradually converge and obtain consistent opinions.

3.3 Analytic Hierarchy Process

AHP is a hierarchical decision analysis method that decomposes the overall goal into various indicators at different levels, and then constructs pairwise comparison judgment matrix at each level to test the consistency, compare the relative importance and determine the weight value. After determining the evaluation indicators system through multiple rounds of expert consultation, yaahp is used to establish a hierarchical structure model, and the weight determination expert questionnaire is distributed in the "Yue ping" comprehensive evaluation service platform. After collecting the expert decision-making data, it is imported into yaahp, automatically constructs the judgment matrix and carries out consistency test, and then calculates the weight value of each indicators.

3.4 Construction Process and Perspective

Pre-service teachers' teaching competency in special delivery classroom are a kind of comprehensive teaching competency presented as a whole. To construct an evaluation indicators system to evaluate this comprehensive teaching competency, it is necessary to analyze and deconstruct it from an all-round and multi angle, and screen out evaluation indicators from different perspectives. According to the theory of teaching competency structure in the previous research, and referring to the micro certification project of teachers' information technology application competency in East China Normal University, this study decomposes the competency from the perspective of organization, teaching and competency, and comprehensively considers the requirements of teachers' role, teaching situation and the definition of teachers' competency. The construction of evaluation indicators system is not a simple combination of evaluation indicators, but a systematic work with purpose and hierarchy. It is also a process of iterative optimization, which is usually completed through several steps as shown in Figure 1.

4. Results

Based on literature review and analysis, following the principles and basis, ideas and methods of constructing evaluation indicators system, this study initially constructs evaluation indicators system of pre-service teachers' teaching competency in special delivery classroom from the three perspectives of pre-service teacher, special delivery classroom and teaching competency. Then, the expert consultation questionnaire was compiled. Following the principle of combining authority and representativeness, experts in the field of educational informatization and teacher education were invited for consultation, and three rounds of expert consultation questionnaires were issued for expert opinions. After the first round of expert consultation, the indicators at all levels have been modified and adjusted to varying degrees. After the second round of expert consultation, the opinions of the expert group basically tend to be consistent.

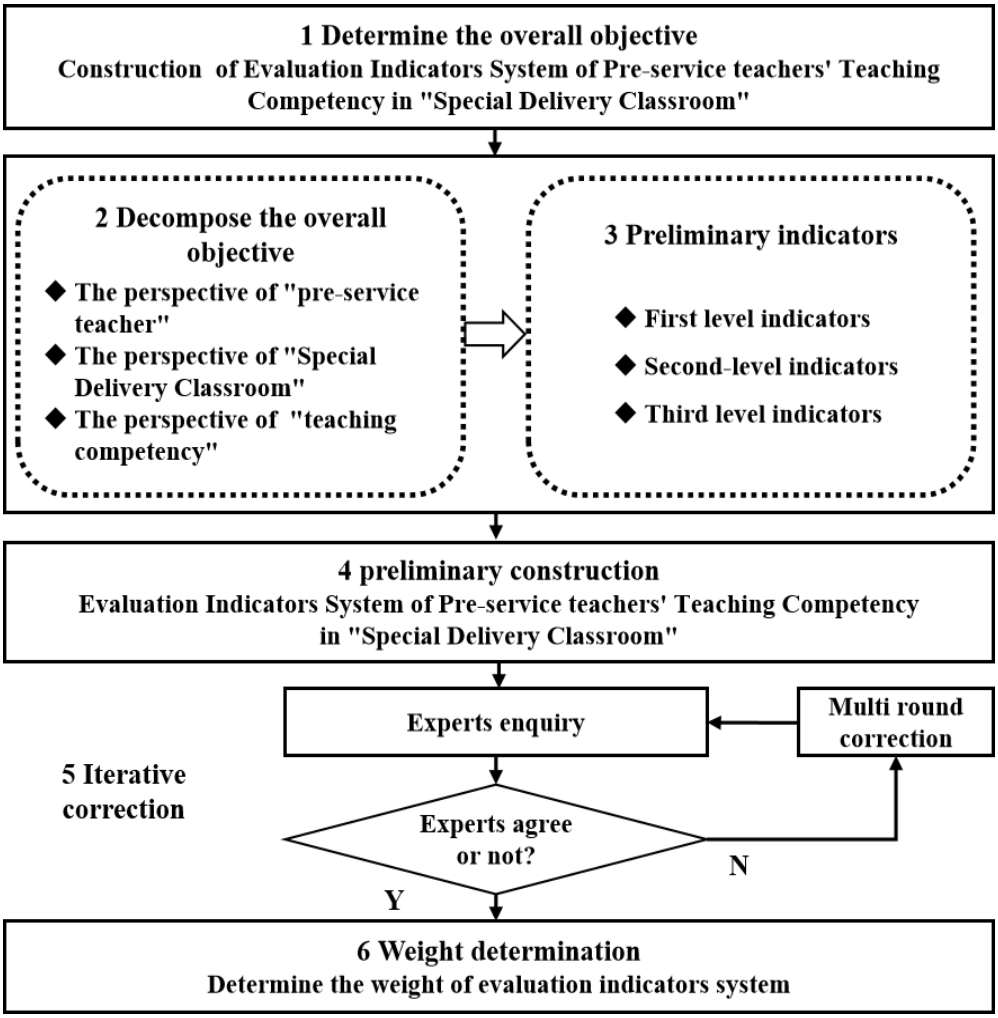

Figure 1. The Construction Process of Evaluation Indicators System.

Weight is the relative importance of an indicators in the whole indicators system. In the third round, the weights of indicators are determined by the combination of Delphi Method and AHP. Firstly, the hierarchical structure model is constructed by yaahp, and then "Yue ping" comprehensive evaluation service platform is used to collect the expert decision-making data, which is imported into yaahp to automatically construct the judgment matrix, and the weight values of indicators at all levels are calculated by group decision-making. Finally, evaluation indicators system of pre-service teachers' teaching competency in special delivery classroom with weight is obtained as shown in Figure 2.

5. Discussion

Due to the limited space, the following is based on the scoring results of the expert group, and only takes the determination of the weight of the first level indicators as an example. In yaahp, based on the hierarchical model, and the experts' scoring results at each level are obtained. The details are shown in Table 1. At the same time, the weight ranking is obtained, as shown in Table 2.

Table 1. *Summary of Expert Consultation Results of First-Level Evaluation Indicators*

A	B1	B2	B3	B4	B5	Wi
B1	1	0.7965	0.2492	1.0238	1.0974	0.1226
B2	1.2555	1	0.3129	1.2854	1.3778	0.1539
B3	4.0132	3.1964	1	4.1087	4.4040	0.4920
B4	0.9768	0.7780	0.2434	1	1.0719	0.1197
B5	0.9113	0.7258	0.2271	0.9329	1	0.1117

First level indicators (Weights)	Second-level indicators (Weights)	Third level indicators (Weights)
B1 Basic literacy related to "special delivery classroom" teaching **(0.1226)**	**C1** Teaching Cognition and Attitude in "Special Delivery Classroom" **(0.0395)**	**D1** Pre-service teachers' value recognition of "special delivery classroom" **(0.0117)**
		D2 Willingness and motivation to participate in practice **(0.0129)**
		D3 Consciousness of coordinated development with teachers in rural small-scale schools **(0.0108)**
		D4 Information Responsibility and Ethics **(0.0040)**
	C2 Teaching knowledge and skills in "special delivery classroom" **(0.0831)**	**D5** Basic knowledge reserve **(0.0340)**
		D6 Mastery of subject professional skills **(0.0492)**
B2 Remote Collaborative Lesson Preparation in "Special Delivery Classroom" **(0.1539)**	**C3** Teaching Design in "Special Delivery Classroom" **(0.0658)**	**D7** Analysis of the academic conditions of students in different schools **(0.0120)**
		D8 Targeted preparation of teaching goals **(0.0058)**
		D9 Targeted integration of teaching content **(0.0069)**
		D10 Targeted selection of teaching strategies **(0.0057)**
		D11 Targeted design of teaching activities **(0.0229)**
		D12 Targeted design of teaching evaluation **(0.0066)**
		D13 Contingency plan development situation **(0.0061)**
	C4 Preparation of Teaching Resources in "Special Delivery Classroom" **(0.0265)**	**D14** Resource acquisition and processing **(0.0145)**
		D15 Resource management application **(0.0120)**
	C5 Preparation of Teaching Environment in "Special Delivery Classroom" **(0.0616)**	**D16** Debugging and operation of hardware equipment **(0.0254)**
		D17 Application of software and platform **(0.0257)**
		D18 Preparation of teaching and learning tools **(0.0105)**
B3 Synchronous and Interactive Teaching in "Special Delivery Classroom" **(0.4920)**	**C6** Teaching Organization and Coordination of "Special Delivery Classroom" **(0.2189)**	**D19** Remotely guide the inspiration through the screen **(0.0544)**
		D20 Presentation of teaching content on the screen **(0.0285)**
		D21 Remote interactive communication through the screen **(0.1360)**
	C7 Teaching Management and Regulation of "Special Delivery Classroom" **(0.1740)**	**D22** The situation of remote real-time communication **(0.0397)**
		D23 The sense of teaching presence of "special delivery classroom" **(0.0501)**
		D24 Dynamically switch screens in real time **(0.0448)**
		D25 Properly handle emergency situations **(0.0394)**
	C8 Teaching Guidance and Intervention of "Special Delivery Classroom" **(0.0990)**	**D26** Targeted remote guidance **(0.0353)**
		D27 Targeted remote intervention **(0.0431)**
		D28 Summary and review of technical support **(0.0206)**
B4 Cooperative Evaluation and Reflection in "Special Delivery Classroom" **(0.1197)**	**C9** Teaching Evaluation and Feedback of "Special Delivery Classroom" **(0.0521)**	**D29** Collaborative teaching evaluation and diagnosis **(0.0247)**
		D30 Feedback of teaching evaluation results **(0.0273)**
	C10 Teaching Reflection and Improvement of "Special Delivery Classroom" **(0.0677)**	**D31** Collaborative teaching reflection and communication **(0.0327)**
		D32 Targeted improvements and adjustments **(0.0350)**
B5 Lifelong learning and collaborative development **(0.1117)**	**C11** Personal learning and development of pre-service teachers **(0.0577)**	**D33** Targeted self-directed learning **(0.0289)**
		D34 Innovative application and development **(0.0289)**
	C12 Coordinated development with teachers in rural small-scale schools **(0.0540)**	**D35** Participate in community collaborative teaching and research **(0.0386)**
		D36 Targeted collaborative learning **(0.0154)**

Figure 2. Evaluation Indicators System (with weight).

Table 2. *First-Level Evaluation Indicators Weight Ranking*

First-level indicators	Weight	Weight ranking
B3	0.4920	1
B2	0.1539	2
B1	0.1226	3
B4	0.1197	4
B5	0.1117	5

6. Conclusion

This study mainly constructs the evaluation indicators system of pre-service teachers' teaching competency in special delivery classroom with weight, and verifies its scientificity, rationality and operability, so as to solve the key problem of "what evaluation should be used?" The results show that the evaluation indicators system constructed by the theoretical method is relatively comprehensive, the weight is relatively reasonable and has strong applicability, which can objectively, comprehensively, fairly and justly evaluate the pre-service teachers' teaching competency in special delivery classroom.

In a word, the research has made some achievements in exploring the theory and method of pre-service teachers' teaching competency evaluation in special delivery classroom, but it still needs to be optimized and improved in the future practice, and deepen and expand the evaluation indicators system for different subjects, different schools and different disciplines. So that the pre-service teachers teaching competency in special delivery classroom evaluation is more standardized, systematic, and gradually toward accuracy and personalization.

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