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A Retrospective Analysis of Higher Vocational Medical Education Based on the CIPP Model

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Abstract: Higher vocational medical education plays a crucial role in the cultivation of outstanding medical talents. Based on the CIPP evaluation model (Context, Input, Process, Product), this paper conducts a systematic analysis of the development of higher vocational medical education, explores the achievements and challenges faced at each stage from multiple dimensions, and puts forward improvement suggestions. This study uses the CIPP model to carry out a systematic review of medical education programs and analyzes their application value from both theoretical and practical perspectives.

Keywords: CIPP model; Project evaluation; Higher vocational medical education

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1. Introduction

The quality of higher education is a key element in achieving a country's sustainable and comprehensive development. When higher education activities are implemented based on appropriate standards, their effectiveness and efficiency will be significantly enhanced. To reach this quality level, it relies on scientific research and systematic evaluation methods. As a multi-dimensional and complex construct, the quality of educational programs is quite challenging to assess accurately. Therefore, evaluation has become a core mechanism for measuring and documenting quality, as well as an important approach to promoting the achievement of educational goals and the realization of visions. Through evaluation, we can identify the alignment between programs and the needs of individuals and society, clarify key influencing factors, and systematically optimize strengths and weaknesses. This provides a basis for educational decision-making and academic improvement, driving the transformation of the education system from a static to a dynamic one.

Effective evaluation depends on reliable models and tools. Among various evaluation models, the CIPP model covers four dimensions, namely the Context, Input, Process, and Product; and provides a systematic evaluation framework for educational programs [1]. Context evaluation aims to establish the rationality of educational goals and identify problems, needs, and opportunities in the environment. Input evaluation focuses on human resources, financial support, policies and strategies, as well as constraints during implementation. Process evaluation centers on teaching execution and performance issues, testing the appropriateness of implementation paths. Outcome

evaluation assesses the effectiveness of educational activities and the degree of goal achievement.

Stufflebeam emphasized that CIPP is a cyclic process that emphasizes improvement rather than mere documentation of outcomes. Its core lies in the continuous enhancement of the quality of educational programs [2]. This model covers the entire process of educational revision, and is particularly suitable for the complexity of medical education programs, capable of providing systematic and constructive information for program optimization and decision-making. CIPP not only addresses specific issues but also emphasizes the evaluation of overall and systematic capabilities.

Most current medical research still focuses on verifying the achievement of preset educational goals, while CIPP is more committed to comprehensively improving educational quality. To explore the current application status and methodological characteristics of this model in medical education, this study adopts a systematic review to analyze its scope of use and practical models.

2. Materials and methods

This study is a systematic review. Relevant papers applying the CIPP model to evaluate medical education programs were retrieved from 14 international and Chinese academic databases, covering the period from April 22, 2019, to June 22, 2025. Given the limited number of literatures in this field, no time limit was set for the retrieval. Literature screening and data extraction were independently conducted by two researchers. In case of disagreements, a third expert was invited to participate in the adjudication, and the final result was based on consensus.

2.1. Search strategy

A specific search strategy was adopted for paper retrieval, with no time restriction. The search covered the period from April 22, 2019, to June 22, 2025. Based on the combination of subject terms and free words, the search was conducted across Chinese and English databases including CNKI, Scopus, PubMed, Web of Science, ProQuest Dissertations, Embase, CINAHL, and ERIC. Supplementary retrieval was also performed on the Google Scholar platform. Keywords included “evaluation”, “program evaluation”, “educational assessment”, “CIPP model”, and “medical education”, used individually or in combinations. It should be noted that there is no corresponding MeSH term for CIPP [3].

Literature screening was divided into three stages: first, Endnote was used to manage the title records and abstracts, with initial screening conducted to remove duplicates and exclude irrelevant topics; second, abstracts were reviewed to select literatures that matched the research topic; third, the full texts were rechecked and finally selected in accordance with the preset inclusion and exclusion criteria (**Table 1**).

Table 1. Inclusion and exclusion criteria of the study

Inclusion criteria	Exclusion criteria
Studies published in English or Chinese	Studies published in languages other than English or Chinese
Full text available for retrieval	Full text not available for retrieval
Related to the evaluation of medical education	Evaluations in fields other than medical education
Evaluations based on the CIPP model	Evaluations based on other evaluation models
Note: CIPP = Context, Input, Process, Product	-

Finally, 41 studies that met the research objectives, were written in English or Chinese, and had full texts accessible to the researchers were selected for qualitative analysis.

2.2. Data extraction and analysis

Two researchers independently extracted data using a pre-designed form. The extracted content included the first author, publication year, region, study design, and research objective. The extraction results were cross-checked. In case of discrepancies, a third researcher was involved in rechecking until a consensus was reached.

2.3. Quality assessment

The quality of studies was evaluated using the CASP (Critical Appraisal Skills Programme) checklist. This tool consists of 18 items, which are categorized into four dimensions: participant characteristics, assessment tools, study design, and results. It uses a "Yes/No" scoring system (1/0 point), with a total score ranging from 0 to 18 [4]. Each literature was independently evaluated by two researchers, and inconsistencies were resolved through negotiation to reach a consensus. Finally, the literatures were classified into three levels based on the total score: Excellent (≥ 13 points), Good (6–12 points), and Poor (≤ 5 points).

For mixed-methods studies, the Mixed Methods Appraisal Tool (MMAT) was adopted [5]. The evaluation covered four aspects: rationality of sampling, data analysis, contextual effects, and researchers' stance. An overall score (0–100%) was given according to the degree of compliance. The MMAT includes four qualitative criteria.

(1) Appropriateness of participant eligibility and sampling process
(2) Data analysis process, including data collection procedures, data format, and data analysis;
(3) Attention to the impact of setting on data collection
(4) Attention to the impact of researchers' ontological and epistemological beliefs

The critical evaluation of mixed methods also includes the relevance of the mixed-methods design, data integration, and attention to methodological limitations. According to the MMAT scoring system, each study was given an overall quality score (Unscored, 25%, 50%, 75%, or 100%).

3. Results

A total of 1,275 literatures were initially retrieved. After removing 836 duplicate literatures via Endnote and manual checking (**Figure 1**), 439 literatures remained and entered the initial screening stage. Two researchers independently reviewed the abstracts, excluding 395 literatures that were inconsistent with the research topic. The remaining 44 literatures proceeded to the full-text review stage. After final full-text reading, 3 studies that did not meet the inclusion criteria were excluded, and a total of 41 literatures on the application of the CIPP model in medical education were included in the analysis.

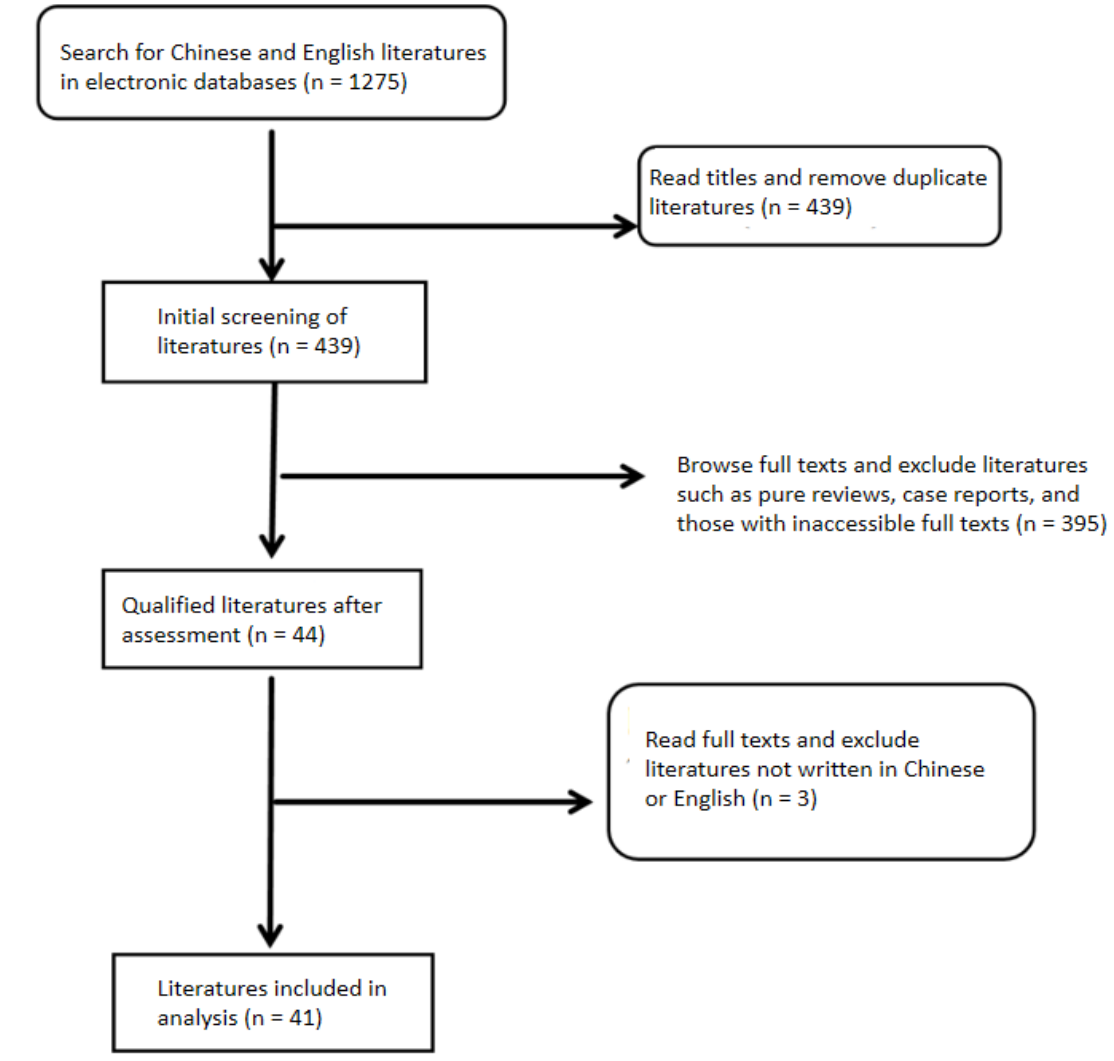

Figure 1. Literature screening process.

The results showed that the application of quantitative research methods was relatively common (**Table 2**). This study mainly focused on the attitudes and quality evaluations of students and teachers towards medical education programs based on the CIPP model, with most studies focusing on the student perspective. A total of 29 studies were descriptive cross-sectional surveys, which used self-designed questionnaires for evaluation; 9 were mixed-methods studies, combining questionnaires and interviews; 2 were qualitative studies, based on individual interviews; and 1 was a review of studies related to the CIPP model.

Table 2. Study types

Language	Quantitative research	Qualitative research	Review	Mixed research
English	13	2	1	8
Chinese	16	0	0	1

According to the quality evaluation results using the CASP tool, 23 studies were of good quality, 13 were of moderate quality, and 5 were of poor quality. From the perspective of evaluation objects, the CIPP model was most widely used in the evaluation of medical courses, while the number of case-based assessment studies was the smallest (**Table 3**).

Table 3. Frequency distribution of CIPP model evaluation in medical education programs

Discipline	n (%)
Midwifery	4 (10)
Medical sciences	14 (34)
Stomatology	4 (10)
Clinical medicine	11 (27)
Healthcare	7 (17)
Medical record research	1 (2)

4. Discussion

4.1. Context evaluation

The CIPP model provides a systematic framework for the evaluation of medical education programs. Its context evaluation dimension aims to comprehensively examine the educational environment, identify strengths, weaknesses, needs, and opportunities. This provides a basis for goal-setting and policy planning, and supports the continuous improvement of educational programs and the optimization of decision-making.

Key factors affecting the satisfaction of educational programs include faculty quality, facility conditions, budget support, content quality, and teaching environment. All these factors are systematically evaluated in the CIPP model. Most studies show high student satisfaction, while some indicate moderate or low levels. This reflects the comprehensiveness of the model in the four-dimensional evaluation of environment, input, process, and outcome [6].

Differences exist in the methods and focuses of context evaluation across different studies. For example, Okhovati et al. evaluated the Health Services Management course at Kerman University of Medical Sciences in Iran and found that the course scored low in goal clarity but performed well in scientific services [7]. Most scholars such as Akhlaghi, Yazdani, Moradi, and Mohebbi have reported positive context evaluation results, indicating that the overall curriculum environment is attractive and reasonable.

However, some studies have also revealed problems at the context level. For instance, in humanities courses, the goal statements are unclear and inconsistent with students' expectations. Niazi's study on a department in Tehran further found that students had insufficient understanding of teaching goals and policies [8]. These problems can be attributed to multiple factors, such as the lack of regular review of goals, disconnection from actual needs, vague expressions, excessive expectations, and differences in environmental structures.

4.2. Input evaluation

Input evaluation aims to systematically examine various resources and strategies invested to achieve educational goals, covering elements such as faculty, students, administrators, financial resources, and academic resources. The core of this dimension is to identify strengths and weaknesses in resource allocation and utilization, providing

a basis for optimizing program design and improving the effectiveness and outcomes of educational programs.

Multiple studies have pointed out obvious shortcomings at the input level. Okhovati et al. found that curriculum management settings were outdated and teaching facilities were insufficient; Yazdani and Moradi noted that although resources were generally abundant, the proportion of theoretical courses to practical courses was unbalanced, and educational facilities still needed improvement. Studies by Mohebbi and Yarmohammadian showed poor conditions of educational budgets and financial resources; Alimohammadi et al. also reported multiple problems in student capabilities, educational content, and equipment. Hemati et al. similarly identified insufficient investment in neonatal intensive care courses.

Phattharayuttawat's evaluation of clinical psychology courses indicated that while investment in faculty-student ratio and educational content was appropriate, clinical wards and case resources were still insufficient. Nagata et al. also found significant deficiencies in infrastructure such as the number of teachers, libraries, and computer systems in Japanese medical courses. In summary, updating educational content and improving resource conditions are key directions for enhancing input quality.

4.3. Process evaluation

Our focus is on how to carefully develop and effectively implement educational plans, as this directly determines the impact of educational plans on students' learning outcomes. Process evaluation mainly includes a comprehensive assessment of various teaching activities, as well as instructors' behaviors, knowledge reserves, and practical experience. It also involves testing and evaluating corresponding management and supervision mechanisms. In other words, this so-called "process" covers all links and activities involved during the entire program implementation period. On this basis, this evaluation system also provides us with a valuable opportunity to further refine and improve the implementation of educational plans by leveraging the valuable results from the previous two evaluation stages.

4.4. Product evaluation

Product evaluation systematically compares the goals of educational plans with actual outcomes to assess the substantial impact of educational programs on graduates' competencies and development. This evaluation not only focuses on graduation rates but also covers multiple outputs such as knowledge innovation and program achievements. Its core lies in objectively judging the appropriateness and effectiveness of educational activities.

Tazakkori's study based on the CIPP model pointed out that a certain medical program had obvious deficiencies in aspects such as philosophy, mission, and goal-setting. Although the curriculum content was consistent with the goals, serious problems occurred during the implementation process, resulting in the final outcomes failing to meet expectations [9]. Ehsanpour's evaluation of midwifery students showed that they lacked experience in clinical management of rare cases. Pakdaman et al. found that while students had high satisfaction with the curriculum, teachers' enthusiasm and professional competence still needed improvement, and the overall learning process and the quality of outputs of some courses were not ideal. Studies by Okhovati et al. indicated that the teaching process performed well in terms of student participation and research interaction; however, graduates' professional skills still did not fully meet the preset standards. In contrast, the courses evaluated by Phattharayuttawat et al. performed excellently in aligning goal-setting with social needs, achieved outstanding performance in the educational process, and most graduates reached the expected competencies [10].

Numerous studies have shown that the connections between internal elements of the education system

have not been fully clarified and even have inconsistencies, with some students failing to achieve the expected educational goals. Therefore, the system should make timely adjustments and establish clear improvement guidelines.

Most current studies tend to use quantitative methods to evaluate educational programs, but to achieve a comprehensive evaluation, it is necessary to integrate quantitative and qualitative data. Although many studies aim to examine the achievement of established goals, the core of the CIPP model emphasizes the continuous improvement of educational quality. This model advocates that evaluation should be forward-looking and run through the entire process of the program. However, existing literatures mostly rely on static methods such as cross-sectional questionnaires. Merely covering the four elements (Context, Input, Process, and Product) does not equate to the actual implementation of CIPP evaluation. For example, studies by Makarem, Pakdaman, and Hemati collected feedback from beneficiaries through questionnaires, but they overemphasized the achievement of outcomes while ignoring systematic and multi-stage improvement, failing to reflect the core principles of CIPP, the comprehensiveness, dynamism, and multi-stakeholder participation [11].

Most evaluations are conducted from the perspective of a single group, failing to integrate diverse viewpoints and in-depth qualitative insights. A comprehensive review of educational programs from the perspectives of different participant groups helps identify potential problems and culturally appropriate strategies. Future studies should advocate mixed methods and build an evaluation framework that is more inclusive and has guiding significance for intervention.

5. Conclusion

This study indicates that the systematic application of the CIPP model (Context, Input, Process, and Product evaluations) combined with formative assessment methods is of crucial significance in the implementation of educational and teaching programs. Based on quantitative and qualitative evidence, continuous adjustments and improvements should be made to all aspects of educational planning to enhance practical effectiveness. Numerous scholars have explored the CIPP model from a forward-looking perspective. Although their studies reveal certain complexities in the implementation of this model, they still strongly support the advancement of educational reforms. Especially when evaluating those often-overlooked qualitative dimensions, the CIPP model helps compensate for the limitations of pure quantitative assessment and obtain diverse and in-depth perspectives. Furthermore, it is necessary to move beyond data collection methods that rely solely on a single group, such as students. Instead, efforts should be made to actively integrate the perspectives of multiple stakeholders, such as teachers, administrators, and industry experts. This will enhance the reliability and validity of the assessment and provide a solid basis for educational decision-making.

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Disclosure statement

The authors declare no conflict of interest.

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