



Development of the Evaluation Indicator System for the Educational Quality of Application-Oriented Undergraduate Colleges in Guangxi

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Conflicts of interest: None Funding: None for the educational quality of application-oriented undergraduate colleges in Guangxi, and (3) examine the feasibility and adaptability of the evaluation indicator system for the educational quality of application-oriented undergraduate colleges in Guangxi. A mixed-method approach combined qualitative research (field studies, in-depth interviews, focus groups, and Delphi Technique) with quantitative research (surveys). The research was conducted in three stages: (1) Analysis of the current state using document review, in-depth interviews, and surveys with 641 participants. Data were analyzed qualitatively (content analysis) and quantitatively (M and SD). (2) Development of the evaluation indicator system through focus group discussions with 15 experts and the Delphi technique with 17 participants, including experts, administrators, and professionals. The findings from Stage 1 helped refine the system, which was analyzed using averages and medians. (3) Evaluation of the system's feasibility and adaptability with five experts using a Likert scale. Data were analyzed to assess feasibility and adaptability. The results revealed (1) education quality in Guangxi's applied undergraduate colleges is moderate, with the input dimension performing best, followed by background/environment, process, and output; (2) the developed evaluation system includes six first-level, 17 second-level, and 50 third-level indicators, addressing resources, processes, and outcomes, and (3) the system's feasibility and adaptability were high level, confirming its practical use for improving education quality.

Key words: Evaluation Indicator, Educational Quality, Application-Oriented Undergraduate Colleges

INTRODUCTION

The development of higher education in China has seen significant growth since 2000, with enrollment expansion marking a notable trend (Liao, 2007). This development has placed China on the path to becoming a global leader in higher education. However, while the expansion has achieved widespread accessibility, challenges remain in meeting international quality standards. Under the dynamics of global economic integration and the Belt and Road Initiative, enhancing the quality of higher education is paramount to transforming China into a "strong country" in education rather than merely a "big country" in terms of scale (Wilkins, 2019).

The Chinese government has prioritized the quality of higher education by issuing numerous policies to reform colleges and universities. For instance, the Outline of the National Medium and Long-term Education Reform and Development Plan (2010–2020) emphasized improving education's quality and development awareness. Additionally, the Overall Plan for Deepening the Reform of Education Evaluation in the New Era sought to establish standards for application-oriented undergraduate institutions, particularly those in ethnic regions such as Guangxi. Despite these initiatives, challenges persist, particularly in bridging the gap between policy goals and practical implementation.

One critical issue lies in the evaluation system for higher education. Evaluation systems often emphasize outcomes

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such as employment rates, degree completions, and resource inputs like faculty and facilities while neglecting process-oriented indicators such as student motivation, engagement, and the quality of teaching-learning interactions (Tian et al., 2022). This imbalance has led to one-sided student development, as evaluation mechanisms fail to capture the nuances of educational processes that foster comprehensive learning and application.

Applied undergraduate colleges in Guangxi face additional challenges due to their unique context within China's education system. As ethnic regions often grapple with limited resources and diverse student populations, there is a pressing need to design evaluation systems that reflect these specific realities. The current evaluation frameworks lack the depth and adaptability required to address the developmental needs of these institutions, resulting in a misalignment between the goals of fostering practical skills and the existing assessment methods (Song, 2021).

The limitations in existing systems create a clear gap between the aspirational goals of education reform and the actual practices observed in institutions. This gap highlights the need for a more robust, process-oriented evaluation indicator system tailored to the unique contexts of applied undergraduate colleges, particularly in ethnic areas such as Guangxi. Addressing this gap is critical to ensuring these institutions meet national standards while catering to local educational needs.

Developing a comprehensive evaluation indicator system is essential to promote quality assurance and align institutional practices with broader national and global education standards. A well-designed system would provide actionable insights into education's process and outcomes, offering a balanced view of institutional performance. Furthermore, it would empower colleges to address gaps in student development and teacher effectiveness, fostering an environment conducive to holistic education.

As proposed by B. Chen (2014) states that the evaluation index system acts as a "baton" for guiding institutional priorities. A scientific and reasonable system promotes positive educational practices, whereas a poorly constructed framework risks hindering development. Thus, this research seeks to design an evaluation indicator system that prioritizes cultivating professional competencies and practical application skills, addressing both institutional and regional specificities.

Expected Contributions: This research is anticipated to contribute significantly to the education quality assurance field. First, it will provide a model for evaluating the educational quality of applied undergraduate colleges that incorporates both outcome-based and process-based indicators. Second, it will offer policy recommendations to enhance the alignment of evaluation systems with institutional objectives and regional needs. Finally, the findings will support the broader goal of elevating China's higher education quality, particularly in ethnic regions, to meet international benchmarks.

In summary, the gap between the intended goals of education quality assurance and the realities faced by applied undergraduate colleges in Guangxi underscores the necessity of this research. By developing a tailored evaluation indicator system, this study aims to bridge these gaps, enabling institutions to achieve their educational objectives and contribute to the national strategy of strengthening the quality of higher education. The research outcomes will benefit Guangxi and provide valuable insights for similar contexts, advancing the broader agenda of educational reform and quality assurance.

Research Objectives

- 1. To examine the current status of education quality evaluation in Guangxi's application-oriented undergraduate universities.
- 2. To develop an evaluation indicator system for the educational quality of application-oriented undergraduate colleges in Guangxi.
- 3. To examine the feasibility and adaptability of the evaluation indicator system for the educational quality of application-oriented undergraduate colleges in Guangxi.

Research Question

- 1. What is the current status of education quality evaluation in Guangxi's application-oriented undergraduate universities?
- 2. How does the evaluation indicator system develop for the educational quality of application-oriented undergraduate colleges in Guangxi?
- 3. To what extent is the feasibility and adaptability of the evaluation indicator system for the educational quality of application-oriented undergraduate colleges in Guangxi?

LITERATURE REVIEW

Concept of Education for Sustainable Development

Education for Sustainable Development (ESD) integrates sustainable development principles into educational systems, fostering competencies for addressing global challenges. Stemming from the United Nations' 2030 Agenda for Sustainable Development, ESD aligns with Sustainable Development Goal 4, emphasizing inclusive and equitable quality education. It aims to develop cognitive, socio-emotional, and behavioral skills, equipping learners with cross-cutting competencies essential for sustainable economic, social, and environmental development (UNESCO, 2020).

Key competencies identified by UNESCO include critical thinking, creativity, communication, collaboration, interdisciplinary thinking, self-awareness, responsibility, and global citizenship. These competencies prepare learners to address complex challenges, promote sustainability, and contribute to societal transformation. Furthermore, higher education institutions play a pivotal role by integrating sustainability into curricula, research, operations, and policies, thereby advancing global sustainable development goals (Lozano et al., 2015; Q. Wang, 2015).

Concept of Quality of Education

Education quality is multifaceted, encompassing educational processes' effectiveness, efficiency, and outcomes. Educational quality is also tied to institutional resources, student outcomes, and value-added development (Astin, 1991)-scholars such as Y. Chen (2003) and Pan (2000) further link it to meeting societal needs and cultivating wellrounded talents, including moral and innovative capacities. Similarly, J. Wang (2002) highlights the alignment of education with sustainable societal and personal development. The International Standards Organization (ISO 8402, 1994) frames quality as the extent to which educational attributes meet developmental and social goals, while other scholars like Feigenbaum (1994) and Sallis (2005) emphasize competitiveness, ethics, and professionalism. Commission on Higher Education (CHED, 2014) adds that quality reflects alignment with institutional missions and the delivery of excellent learning outcomes.

In summary, education quality involves professional teaching, effective learning methods, equitable resource allocation, and fostering students' knowledge, skills, and values for future societal contributions. Continuous improvement and fair resource distribution are essential for ensuring high-quality education and cultivating globally competent talents.

Education Evaluation Indicator Systems

The development of education quality evaluation indicator systems focuses on three key research areas: (1) institutional guidelines from international organizations or national agencies, (2) practical applications of these indicators, and (3) theoretical perspectives on their construction. Examples include the U.S. Perkins Vocational Education and Technology Act (PVETA), which evaluates vocational education quality based on academic achievement, technical skills, and employment rates, and the UK's Education Inspection Framework (EIF), which emphasizes school self-assessment through indicators like student achievement, curriculum design, and school-enterprise cooperation. Scholars such as Visser (2015) and Liu (2011) highlight the importance of tailoring these systems to the unique characteristics of students, institutions, and faculty quality while integrating theoretical and practical considerations.

The Component of the Evaluation Indicator Systems of the Educational Quality

This article discusses the development of evaluation indicators for assessing the quality of higher education. Various scholars propose comprehensive indicator systems incorporating funding, student quality, teacher qualifications, education environment, and institutional performance. Key frameworks emphasize primary indicators like input, process, and output, with sub-indicators addressing aspects such as education funding, teaching resources, academic performance, and societal contributions. The systems aim to evaluate and improve education quality through structured methodologies, ensuring feedback mechanisms guide continuous improvement.

Application-Oriented Undergraduate

Applied undergraduate education in China focuses on cultivating high-level, application-oriented talents to meet the needs of regional economic and social development. Proposed in 1998, this education model distinguishes itself from traditional academic and vocational institutions by emphasizing practical skills, industry-university cooperation, and a curriculum tailored to local and national demands. Key features include integrating academic and technical training, fostering innovation, and aligning with the needs of industries and local economies. Policies like the 2015 "Guiding Opinions" further support the transformation of undergraduate colleges into applied institutions, aiming to cultivate skilled, innovative professionals. Guangxi's applied undergraduate colleges exemplify this educational approach.

Based on the review of documents and related research, the research framework can be summarized as in Figure 1.

As shown in Figure 1, the flowchart outlines the development of an evaluation indicator system for assessing the educational quality of application-oriented undergraduate colleges in Guangxi. It begins by drawing from related theories on evaluation index systems for applied undergraduate education quality.

Key components include evaluating educational quality and creating a tailored indicator system for application-oriented universities. The process involves three major steps:

1) Studying Current Challenges

A mixed-method approach combines questionnaires and case studies to analyze educational quality evaluation systems' current situation and challenges. The study focuses on specific application-oriented colleges in Guangxi.

2) Developing the Indicator System

This involves creating an evaluation framework based on Delphi methodology, refining key indicators through expert consensus, and conducting focus group discussions. The indicators are categorized into five main areas: educational environment, teaching quality, management, faculty and staff quality, and student outcomes.

3) Testing Feasibility and Adaptability

Trials in selected institutions assess the system's practicality and relevance to ensure it is adaptable to the needs of application-oriented colleges and universities.

RESEARCH METHODOLOGY

This study employs a mixed-method approach, incorporating qualitative research through field studies with in-depth interviews, focus groups, Delphi Technique, and quantitative research through survey methods. The research process is divided into three main steps:

- 1. Analyzing the current state
- 2. Developing the indicator system through focus group discussions and the Delphi Technique.



Figure 1. Summarize the research framework

3. Evaluating the system's feasibility and suitability to ensure its effectiveness.

The sample

The samples were 15 experts and the Delphi technique with 17 participants, including experts, administrators, and professionals. The details of the research implementation for each stage are as follows:

Study the current state and challenges of the evaluation indicator system

We used mixed-methods approach combining document review, in-depth interviews, and surveys by:

- 1. Reviewing documents to identify components and indicators,
- 2. Collecting quantitative data through questionnaires (sample of 641 participants, using stratified random sampling), and

3. Analyzing data qualitatively (content analysis) and quantitatively (mean and standard deviation).

Develop an evaluation indicator system

We developed the indicator system by conducting focus group discussions (15 experts) to refine the indicator system and using the Delphi Technique to select indicators (17 participants, including experts, administrators, and external professionals).

To completed this stage we:

- 1. Utilized the findings from Stage 1 to draft the indicator system, and
- 2. Analyzed the data using averages, medians, and interquartile ranges to finalize the indicators.

Assess the feasibility and suitability of the indicator system

We used an evaluation form to assess the feasibility and suitability of the system with five experts. We collected quantitative data using a Likert scale and analyzed the data using mean and standard deviation values to interpret the level of feasibility and suitability.

RESULTS

This study focused on developing and evaluating an education quality evaluation index system for applied undergraduate colleges in Guangxi. The conclusions are summarized into three key parts:

Current State of Education Quality

The education quality of applied undergraduate colleges in Guangxi was assessed across four dimensions, with an overall moderate level. Among these, the input dimension ranked highest, followed by the background/environment, process, and output dimensions. The results highlight significant room for improvement, especially in the process and output dimensions, which require immediate attention.

Development of the Evaluation Indicators System

A comprehensive evaluation index system was constructed using a combination of literature review, interviews, focus groups, and the Delphi method: Experts independently propose initial evaluation indicators based on their expertise or literature review; Consensus and Finalization: After several iterations (usually two to three rounds), a refined, consensus-based set of evaluation indicators is finalized, ready for practical implementation.Finally, the system includes 6 firstlevel indicators, 17 second-level indicators, and 50 thirdlevel indicators, covering educational resources, processes, and outcomes. This structure ensures the system is both scientific and systematic, as summarized in Table 1.

Table 1 shows 6 indicators of the first level, 17 indicators of the second level, and 50 indicators of the third level.

Feasibility and Adaptability of the Index System

The system's adaptability and feasibility were rated highly, with average scores ranging from 3.60 to 4.80 for applicability and 4.00 to 4.80 for feasibility. These findings confirm that the developed index system is practical, reliable, and suitable for evaluating and improving education quality in applied undergraduate colleges in Table 2.

Table 2 shows the results of the analysis of the effectiveness of the evaluation index system for the education quality of applied undergraduate colleges in Guangxi revealed that the Adaptability M=4.17, SD=0.60. The Feasibility M=4.32, SD=0.59. The value of Adaptability and Feasibility was high.

DISCUSSION

The results of this study on the evaluation index system for education quality in applied undergraduate colleges in Guangxi can be discussed in three main parts, highlighting the current state of education quality, the construction of the evaluation index system, and its effectiveness.

Current State of Education Quality in Guangxi Applied Undergraduate Colleges

The findings reveal that the education quality in Guangxi applied undergraduate colleges is moderate across four aspects: input, background and environment, process, and output. Notably, the input aspect exhibits the highest performance, followed by background and environment, while the process and output aspects remain weaker. This aligns with previous research emphasizing the challenges of ensuring effective processes and impactful outcomes in applied undergraduate education systems (Zhao & Zhang, 2020). The emphasis on input factors, such as financial and human resources, indicates the institutions' prioritization of foundational investments. However, greater attention is needed to strengthen teaching practices and graduate success rates.

Construction of the Evaluation Indicator Systems

Using literature reviews, interviews, and the Delphi method, the study developed a comprehensive evaluation index system encompassing 6 first-level indicators, 17 second-level indicators, and 50 third-level indicators. This system effectively integrates educational resources, processes, and outcomes, offering a holistic perspective on education quality. The findings are consistent with the work of Korhonen et al. (2019), who also highlighted the importance of multi-dimensional evaluation frameworks to reflect the complex nature of applied undergraduate education. Including diverse indicators—from school environment and investment levels to student development—underscores the need for an interconnected approach to education quality assessment.

Effectiveness and Applicability of the Index System

The study demonstrated that the evaluation index system possesses high applicability and feasibility, with average scores between 3.60 and 4.80. These results indicate that the system is practical and adaptable for Guangxi-applied undergraduate colleges. Previous studies by Rado (2020) support the significance of such adaptable systems, emphasizing their role in guiding institutional improvements and policy development. Moreover, the student-centered philosophy embedded in this system reflects a modern approach to education quality, ensuring alignment with global education quality standards.

Implications for Practice

The findings highlight several practical implications. First, education stakeholders must collaborate to ensure accurate data collection and informed decision-making. Second, the guiding role of the evaluation results should be utilized to target improvements in weaker areas, particularly in teaching processes and student outcomes. Lastly, institutions should integrate quality dimensions, such as school environment, investment, teaching staff, and student quality, to create a synergistic effect that enhances overall education quality.

First-level Indicators	Second-level Indicators	Third-level Indicators			
Educational environment	Human environment	Teacher-student relationship			
		Peer relationship			
		The campus culture of humanistic care			
	Physical Environment	School area			
		Proportion of smart classrooms			
		Number of books in the library			
		Number of training bases			
		Number of laboratories			
	Information environment	Application of digital resources			
		Teaching information system			
Development Level	Scale structure	Number of enrolled students			
		The scale of academic disciplines			
	Sustainable development capabilities	Sustainability of educational resources			
		Sustainable development capability of management level			
	Internationalization	Teachers' international perspectives			
		Cultivation of international students			
		Number of international collaborations			
Investment Level	Infrastructure	Investment in living facilities			
		Investment in application-oriented teaching facilities			
		Investment in practical facilities			
		Sports and cultural facilities			
	Social resource investment	Corporate investment			
		Public donations			
	Financial investment	Educational funding per student			
		Government appropriations			
Teacher Level	Teachers	Proportion of application-oriented teachers			
		Teachers' application-oriented skills and professional competence			
	Professional Development	Application-oriented education and training			
		Research on application-oriented teaching			
	Teachers' treatment	Teacher salary and benefits			
		Teachers' social welfare			
		Teachers' professional status			
School Quality	School Management	Integration of application-oriented features into regulations			
		Organization of application-oriented work			
		Mechanism for application-oriented operations			
	Resource Integration	Resource integration of industry-university-society			
		Collaboration between schools and families			
	School influence	Social Reputation			
		Industry influence			
		Regional influence			
Student Quality	Student Development	Classroom participation			
		Activity participation			
		Number of award-winning students in academic competitions			
		Knowledge and skills			
		Social adaptability			
		Students' innovation ability			
		Students' practical ability			

Table 1. Evaluation index system of education quality of applied undergraduate colleges in Guangxi

Table 1. (Continued)		
First-level Indicators	Second-level Indicators	Third-level Indicators
	Graduate Quality	Fit between people and professions.
		Quality of graduates' employment
		Career development of graduates

Table 2. Effectiveness of the evaluation index system for the education quality of applied undergraduate colleges in Guangxi

Indicators	Adaptability			Feasibility		
	М	SD	Result	М	SD	Result
Educational environment						
Human environment	4.20	0.83	High	4.20	0.83	High
Physical Environment	4.40	0.54	High	4.60	0.54	Highest
Information environment	3.80	0.44	High	4.40	0.44	High
Total	4.13	0.67	High	4.40	0.61	High
Development Level						
Scale structure	4.00	0.70	High	4.20	0.83	High
Sustainable development capabilities	3.60	0.54	High	4.60	0.54	Highest
Internationalization	3.80	0.44	High	3.80	0.44	High
Total	3.95	0.56	High	4.20	0.61	High
Investment Level						
Infrastructure	4.60	0.54	Highest	4.40	0.44	High
Social resource investment	4.40	0.44	High	3.60	0.54	High
Financial investment	4.60	0.54	Highest	4.20	0.83	High
Total	4.53	0.51	High	4.06	0.61	High
Teacher Level						
Teachers	3.60	0.54	High	4.80	0.44	Highest
Professional Development	4.40	0.44	High	4.60	0.89	Highest
Teachers' treatment	4.20	0.83	High	4.40	0.44	High
Total	4.06	0.61	High	4.60	0.54	Highest
School Quality						
School Management	4.40	0.44	High	4.20	0.97	High
Resource Integration	4.60	0.54	Highest	4.40	0.44	High
School influence	3.80	0.70	High	4.00	0.63	High
Total	4.26	0.56	High	4.20	0.68	High
Student Quality						
Student Development	3.60	0.83	High	4.60	0.54	Highest
Graduate Quality	4.60	0.54	Highest	4.40	0.44	High
Total	4.10	0.69	High	4.50	0.49	High
Overall total	4.17	0.60	High	4.32	0.59	High

CONCLUSION

The following conclusions can be made based on our findings:

- 1. Institutions should integrate the developed evaluation index system into their routine assessment practices to monitor and improve educational quality.
- 2. Education administrators should prioritize areas identified as weaker—particularly process and output and implement targeted strategies to address these challenges.
- 3. Collaboration among stakeholders, including educators, policymakers, and students, should be encouraged to ensure the effective application of the evaluation framework.
- 4. Regular training sessions for education administrators and staff should be conducted to familiarize them with the evaluation index system and its practical applications.

The following recommendations can be presented based on our findings:

- 1. Further research should focus on refining the evaluation index system by incorporating feedback from its practical application in different educational settings.
- Empirical validation of the system using structural equation modelling and other advanced statistical techniques is recommended.
- 3. Comparative studies between applied undergraduate colleges in Guangxi and those in other regions or countries could provide broader insights and benchmarks.
- Future studies should explore the long-term impact of using the evaluation index system on institutional performance and student outcomes.

Future studies could focus on developing specific evaluation scales based on this index system and testing its structural validity using empirical methods such as structural equation modelling. Additionally, case studies of selected schools could provide insights into the system's practical implementation and suggest refinements for greater effectiveness. This approach aligns with emerging research trends advocating for the iterative development of education quality evaluation frameworks (S. Chen, 2014).

This study developed a scientifically rigorous and systematic evaluation indicator system to assess the educational quality of application-oriented undergraduate colleges in Guangxi. The system comprises 6 first-level indicators, 17 second-level indicators, and 50 third-level indicators, ensuring a comprehensive evaluation framework. It focuses on three key dimensions of education quality: input, process, and output. The findings reveal that the current educational quality in these institutions is moderate, with strengths in input but significant weaknesses in process and output, highlighting areas for improvement.

The indicator system demonstrated high applicability and feasibility, with strong ratings confirming its suitability for practical implementation. A key feature of the framework is its student-centered approach, which emphasizes student development as the primary objective of educational quality enhancement. This system provides actionable insights for policymakers and institutions to address weaknesses and use the evaluation results to guide continuous improvement in education quality.

Future research can further refine and validate the system through empirical studies and case-specific applications, ensuring its operability and effectiveness in various educational contexts.

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