

Research on Evaluation Index System of Teacher Satisfaction for Chinese Digital Educational Platforms

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Abstract

In recent years, China's digital educational platforms have experienced rapid growth, becoming crucial tools in teaching. However, their success doesn't solely rely on their technology and features; it crucially hinges on the level of acceptance and satisfaction among teachers. Despite significant attention in this field, in-depth research into teacher satisfaction with Chinese digital educational platforms remains insufficient. This study aims to comprehensively investigate and analyze the factors influencing teacher satisfaction towards these platforms, exploring teachers' attitudes, usage patterns, and experiential feedback across different platforms. The survey covers five key indicators: personalized support, resource quality, user experience, functionality, and teaching effectiveness. Through the Analytic Hierarchy Process (AHP) and consistency checks, an evaluation system for teacher satisfaction with digital educational platforms was established, offering guidance and recommendations for platform optimization and improved teaching quality. Weight judgment for various indicators highlights the importance of resource practicality, user emotional experience, student engagement, and teaching quality as critical factors.

Keywords

Educational Informatization; Educational Digitalization; Digital Educational Platforms.

1. Introduction

In China, the rapid development of digital educational platforms has become an indispensable tool in the teaching process. These platforms provide teachers with extensive teaching resources, tools, and interactive features to support personalized teaching and classroom innovation. However, the success of digital educational platforms depends not only on their functionality and technology but more crucially on the acceptance and satisfaction of teachers. Currently, there is a lack of in-depth research on teacher satisfaction regarding Chinese digital educational platforms. Understanding teachers' perceptions, user experiences, and satisfaction with digital educational platforms is crucial for advancing educational technology and enhancing teaching effectiveness.

This study aims to comprehensively investigate and analyze the factors influencing teacher satisfaction with Chinese digital educational platforms. By collecting and analyzing teachers' viewpoints and feedback, it seeks to explore their attitudes, usage patterns, and experiential feedback concerning various digital educational platforms. This research aims to delve into the challenges and requirements faced by teachers regarding digital educational platforms, thereby providing viable recommendations for optimizing existing platforms or developing new platforms that better cater to teaching needs. This study holds significant guiding significance for advancing Chinese digital educational platforms, enhancing teaching quality, and better meeting the needs of both teachers and students.

2. Literature Review

Currently, research on teacher satisfaction with Chinese digital educational platforms is receiving considerable attention and experiencing robust development. This field of study covers multiple facets, including assessments of various digital educational platform functionalities and features, surveys on teachers' experiences using these platforms, and quantitative and qualitative analyses of factors influencing teacher satisfaction. Scholars both domestically and internationally have explored teachers' perceptions, acceptance levels, usage experiences, and the actual impact on teaching using methods such as questionnaire surveys, in-depth interviews, and statistical analyses.

Studies indicate that teacher satisfaction with digital educational platforms is influenced by several factors, such as the completeness of platform functionalities, the quality and richness of resources, technical support, and user-friendliness of the interface. Some studies focus on evaluating platform functionality and applicability, while others emphasize teachers' personalized needs and aspects of teaching innovation. Despite some research achievements, challenges persist in better meeting the diverse needs of different teacher groups, optimizing platform functionalities, and addressing teachers' requirements for technical training. Therefore, current research trends aim to delve deeper into the key factors behind teacher satisfaction and propose more targeted improvement suggestions to enhance digital educational platforms' service to teachers and elevate teaching quality.

However, these studies have certain limitations. Firstly, despite numerous studies focusing on teacher satisfaction, a more in-depth exploration of specific factors influencing satisfaction and their interrelationships is needed. Secondly, existing research methodologies differ, with some leaning toward quantitative analysis and others favoring qualitative research, potentially leading to limitations in comprehensive understanding. Additionally, some studies fail to cover the diverse needs of teacher groups in different regions, disciplines, and educational backgrounds, affecting the universality and applicability of research findings. Furthermore, there remain challenges in translating research outcomes into actual teaching improvements and platform optimizations. Although research provides insights and a theoretical foundation, a deeper exploration is needed on how to more effectively apply research outcomes to teaching practices and platform design in practical settings.

Therefore, while current research is flourishing, there is a need for a more in-depth exploration of factors influencing teacher satisfaction, a more comprehensive coverage of diverse teacher group needs, and better strategies for translating research outcomes into practical teaching practices and platform improvements.

3. Variable Selection and Definition

For the evaluation of teacher satisfaction with Chinese digital educational platforms, we've chosen five key indicators: Personalized Support, Resource Quality, User Experience, Functionality, and Teaching Effectiveness. We conducted an investigation into the significance of these five indicators to understand the focal points of teachers when using digital educational platforms. By assessing different platforms in these five aspects such as personalized teaching support, richness of resources, user interface friendliness, completeness of functionalities, and their impact on teaching effectiveness, our aim is to analyze teacher satisfaction with various platforms. Through data analysis, we hope to determine which digital educational platforms excel in these five key variables among the teacher community, offering improvement suggestions to educational platforms to enhance teacher satisfaction and teaching quality.

Personalized Support evaluation encompasses the extent to which digital educational platforms meet teachers' personalized needs. This support reflects whether the platform can

offer customized teaching plans, resource recommendations, or teaching support based on specific needs and teaching styles. Assessing personalized support considers whether the platform can flexibly adapt to diverse teaching needs, providing tailored teaching solutions, including customized services for different subjects, student groups, or teaching styles. Evaluating personalized support helps understand the platform's capability to meet teachers' personalized needs, subsequently impacting teacher satisfaction and user experience.

Resource Quality evaluation involves a comprehensive assessment of the teaching resources provided by digital educational platforms, covering the quality, practicality, and diversity of resources. In an educational context, resource quality assessment focuses on whether the platform's teaching resources possess high quality and practicality, including textbooks, courseware, videos, etc. Additionally, the assessment also considers the scope and diversity of resources, i.e., whether the platform offers a rich variety of resources covering different subjects and teaching needs. Evaluating resource quality assists teachers in comprehensively understanding the value and applicability of platform-provided resources, significantly contributing to enhancing teaching quality and meeting personalized teaching needs.

User Experience evaluation involves teachers' overall perception and emotional experience when using digital educational platforms. This evaluation includes the platform's interface friendliness, ease of interaction design, smoothness of operation processes, and comfort during usage. User experience assessment also examines whether teachers can easily find required functions, whether the interface is clear and understandable, and if the operation is intuitive and convenient. This evaluation helps understand the comfort and convenience levels for teachers when using the platform, thereby influencing their satisfaction and willingness to use it.

Functionality evaluation is a comprehensive assessment of the functionalities provided by digital educational platforms, covering completeness, practicality, and applicability. In an educational setting, functionality assessment considers whether the platform offers comprehensive functionalities that meet teaching requirements, such as course publishing, assignment management, interactive learning tools, etc. Simultaneously, it focuses on the practicality of these functionalities—whether users can easily operate the platform, if the interface design is user-friendly, and if the operations are simple. Moreover, applicability is also a crucial factor considered, i.e., whether functionalities are suitable for different subjects, teaching scenarios, and personalized teacher needs. This evaluation helps teachers comprehensively understand if platform functionalities align with their teaching requirements, thereby influencing their user experience and satisfaction with the platform.

Teaching Effectiveness evaluation is a comprehensive assessment of the impact and effects of digital educational platforms on teachers' teaching activities during the teaching process. This evaluation includes the extent to which the platform enhances student learning outcomes, participation, and teaching quality. Teaching effectiveness assessment examines the platform's role in improving student learning outcomes, participation, and the quality of teaching. Through this evaluation, teachers can better understand the platform's role and influence in actual teaching, thereby better assessing its practical value and teaching effectiveness.

4. Constructing the Evaluation System for Teacher Satisfaction with Chinese Digital Educational Platforms

4.1. Establishment of Satisfaction Index System and Hierarchical Structure

The establishment of the satisfaction evaluation index system for digital education platforms utilized a method similar to the Analytic Hierarchy Process (AHP), integrating qualitative analysis and quantitative calculations to comprehensively measure teachers' satisfaction with the platform. Educational platforms encompass various features such as teaching services,

network characteristics, timeliness of educational resources, and economies of scale. Therefore, the satisfaction index system needs to fully reflect these characteristics and factors. The construction of this system first decomposed the level of teacher satisfaction, defining functionality, resource quality, user experience, personalized support, and teaching effectiveness as primary evaluation indicators. Further, these primary indicators were broken down into multiple secondary evaluation indicators to more intricately assess specific platform features and influencing factors, designed in a positive descriptive manner, thus constructing the satisfaction evaluation system for digital education platforms.

Table 1. Evaluation System for Teacher Satisfaction on Chinese Digital Education Platforms

Overall Indicator Level O	Sub-goal Level A	Criteria Level C
The Indicator System for Teacher Satisfaction on Chinese Digital Education Platforms	Personalized Support	Personalized Resource Recommendations
		Personalized Teaching Plans
		Personalized Teaching Support
	Resource Quality	Resource Diversity
		Resource Production Quality
		Resource Utility
	User Experience	Overall User Perception
		User Emotional Experience
	Functionality	Functional Completeness
		Functional Applicability
		Functional Utility
	Teaching Effectiveness	Student Learning Outcomes
		Student Engagement
		Teaching Quality

In order to quantify decision-making judgments, certain numerical values are often assigned to "importance" based on a specific ratio scale. Table 2 lists 5 importance levels and their corresponding assigned values.

Table 2. Assessment Scale for Judgment Matrix

Scale	Definition	Implication
1	equally important	The two factors A1 and A2 are equally important.
3	slightly important	A1 is slightly more important than A2.
5	considerably important	Based on experience and judgment, there is a strong preference for A1 over A2 in importance.
7	noticeably important	There is a definite inclination for A1 to be significantly more important than A2.
9	absolutely important	There is evidence confirming that a certain factor is extremely important when comparing A1 and A2.
2, 4, 6, 8	-	Intermediate value between the aforementioned standards.
The reciprocal of the above values.	-	When A1 is compared to A2, if a certain scale value A12 is assigned, then the ratio A21 when comparing A2 to A1 is the reciprocal $1/A_{12}$ of that scale value.

4.2. Calculating Weights and Conducting Consistency Checks

After reviewing relevant literature, we borrowed the weights calculated using the Delphi method from the literature to study and determine the weights of the evaluation index subset.

This paper utilizes the column sum method in the approximation method to calculate the weights of the judgment matrix. The calculation formula is as follows:

$$w_i = \frac{1}{n} \sum_{j=1}^n \left[a_{ij} / \sum_{k=1}^n a_{kj} \right]$$

Due to the complexity of objective phenomena and the differences in people's perceptions, demanding complete consistency in every judgment is evidently impractical. However, to ensure that the conclusions obtained through the Analytic Hierarchy Process (AHP) align with common sense, it is necessary to conduct a consistency check on the constructed judgment matrix. The usual approach involves introducing consistency indicators, CI (Consistency Index), and a random indicator, RI (Random Index), for matrices of the same order within the Analytic Hierarchy Process. These indicators are:

$$CI = \lambda_{\max} - n / n - 1$$

$$\lambda_{\max} = \sum_{i=1}^n \frac{(AW)_i}{nW_i}$$

$$CR = CI/RI \quad AW = \lambda_{\max} W$$

When the order is greater than 2, the consistency of the judgment matrix is tested using the ratio of CI to RI, that is, the consistency ratio $CR = CI/RI$. If $CR < 0.1$, it is considered that the judgment matrix has satisfactory consistency; otherwise, the judgment matrix needs to be adjusted. Through the consistency check, the formula $AW = \lambda_{\max} W$ is used to obtain W as the weight of n factors. Based on the above steps and formula, the weights of the judgment matrix for the sub-criteria layer and the decision-making layer of the digital platform teacher satisfaction are calculated, and after calculating CR , they all passed the consistency check.

5. Weight Judgment Results

Following the standards in Table 2, we assigned weights to the inter-factor relationships between various indicators in Tables 3 to 9. Using the Analytic Hierarchy Process to pairwise compare the indicators in Tables 3 to 9, we calculated the respective weights for the sub-criteria and the criteria layer. Multiplying these weights further provided the ultimate weights for the 14 secondary indicators (1). Table 10 clearly demonstrates that among the 14 criteria layer indicators, practicality of resources, user emotional experience, student engagement, and teaching quality are the four highest-weighted indicators. This aligns with the real-life scenario.

Table 3. Mutual factor weights of sub-target layer A to total index layer O

Mutual factor weights of sub-target layer A to total index layer O					
O	A1	A2	A3	A4	A5
A1	1	1/6	1/4	1/5	1/8
A2	6	1	6/4	6/5	6/8
A3	4	4/6	1	4/5	4/8
A4	5	5/6	5/4	1	5/8
A5	8	8/6	8/4	8/5	1

Table 4. Mutual factor weights of criterion layer C to sub-target layer A1

Mutual factor weights of criterion layer C to sub-target layer A1			
A1	C11	C12	13
C11	1	1/3	1/4
C12	3	1	3/4
C13	4	4/3	1

Table 5. Mutual factor weights of criterion layer C to sub-target layer A2

Mutual factor weights of criterion layer C to sub-target layer A2			
A2	C21	C22	C23
C21	1	1/2	1/5
C22	2	1	2/5
C23	5	5/2	1

Table 6. Mutual factor weights of criterion layer C to sub-target layer A3

Mutual factor weights of criterion layer C to sub-target layer A3		
A3	C31	C32
C31	1	1/3
C32	3	1

Table 7. Mutual factor weights of criterion layer C to sub-target layer A4

Mutual factor weights of criterion layer C to sub-target layer A4			
A2	C41	C42	C43
C41	1	1/2	1/2
C42	2	1	2/2
C43	2	2/2	1

Table 8. Mutual factor weights of criterion layer C to sub-target layer A5

Mutual factor weights of criterion layer C to sub-target layer A5			
A2	C51	C52	C53
C51	1	1/2	1/3
C52	2	1	2/3
C53	3	3/2	1

Table 9. Average random consistency index

Overall Indicator Level O	Sub-goal Level A	Criteria Level C	Weight
The Indicator System for Teacher Satisfaction on Chinese Digital Education Platforms	Personalized Support (0.042)	Personalized Resource Recommendations(0.125)	0.005
		Personalized Teaching Plans(0.375)	0.016
		Personalized Teaching Support(0.500)	0.021
	Resource Quality (0.25)	Resource Diversity(0.125)	0.031
		Resource Production Quality(0.250)	0.063
		Resource Utility(0.625)	0.156
	User Experience (0.167)	Overall User Perception(0.250)	0.042
		User Emotional Experience(0.750)	0.125
	Functionality (0.208)	Functional Completeness(0.200)	0.042
		Functional Applicability(0.400)	0.083
		Functional Utility(0.400)	0.083
	Teaching Effectiveness (0.333)	Student Learning Outcomes(0.167)	0.056
		Student Engagement(0.333)	0.111
		Teaching Quality(0.500)	0.166

6. Empirical Research

After establishing the customer satisfaction index system, we selected four domestic express delivery companies with relatively high market share and recognition for empirical research: Tencent Classroom, Chinese University MOOC, Wisdom in Vocational Education, and Wisdom Tree. In selecting research subjects, we categorized Chinese University MOOC as the primary tier, followed by Tencent Classroom and Wisdom Tree as the secondary tier, and conducted separate research on Wisdom in Vocational Education to ensure the representativeness and universality of our sample.

Regarding data collection, our team conducted an online survey using the Questionnaire Star platform, and successfully received 426 valid responses. The results of the reliability and validity test of the questionnaire are as follows:

Cronbach's $\alpha = 0.974$, ranging between 0.9 and 1, indicating a high level of questionnaire reliability.

7. Conclusion

The expansion of digital educational platforms in China has been instrumental in transforming the teaching landscape, offering educators an array of resources, tools, and interactive features. These platforms foster personalized teaching methodologies and classroom innovation, positioning themselves as indispensable assets in education. However, their success isn't solely reliant on technological prowess but heavily hinges on teachers' acceptance and contentment. Despite this importance, thorough research on teacher satisfaction with Chinese digital educational platforms remains scarce. Understanding educators' perceptions, experiences, and satisfaction with these platforms becomes pivotal in advancing educational technology and improving teaching effectiveness.

This study endeavors to comprehensively analyze the factors influencing teacher satisfaction regarding Chinese digital educational platforms. Through the collection and analysis of teachers' feedback and perspectives, it seeks to uncover their attitudes, usage patterns, and experiential insights across various digital education platforms. By delving into the challenges teachers face and their requirements concerning these platforms, this research aims to offer feasible recommendations for platform optimization or development that aligns better with teaching needs. This study holds substantial importance in guiding the evolution of Chinese digital educational platforms, elevating teaching quality, and catering more effectively to teachers' and students' needs.

Despite burgeoning research, there remains a necessity for a more profound exploration into the factors influencing teacher satisfaction, encompassing a wider array of teacher groups' needs and devising effective strategies to translate research findings into tangible teaching enhancements and platform improvements.

With these endeavors, this research aims to bridge the gap between theoretical insights and practical implementations, fostering a more profound understanding of teacher satisfaction with Chinese digital educational platforms and propelling advancements in educational technology.

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References

- [1] Aldowah H, Al-Samarraie H, Alzahrani A I, et al. Factors affecting student dropout in MOOCs: a cause and effect decision-making model[J]. *Journal of Computing in Higher Education*, 2020, 32: 429-454.
- [2] Badali M, Hatami J, Banihashem S K, et al. The role of motivation in MOOCs' retention rates: a systematic literature review[J]. *Research and Practice in Technology Enhanced Learning*, 2022, 17(1): 1-20.
- [3] Baturay M H. An overview of the world of MOOCs[J]. *Procedia-Social and Behavioral Sciences*, 2015, 174: 427-433.
- [4] Borrella I, Caballero-Caballero S, Ponce-Cueto E. Taking action to reduce dropout in MOOCs: Tested interventions[J]. *Computers & Education*, 2022, 179: 104412.
- [5] Castaño-Muñoz J, Rodrigues M. Open to moocs? Evidence of their impact on labour market outcomes[J]. *Computers & Education*, 2021, 173: 104289.
- [6] de Moura V F, de Souza C A, Viana A B N. The use of Massive Open Online Courses (MOOCs) in blended learning courses and the functional value perceived by students[J]. *Computers & Education*, 2021, 161: 104077.
- [7] Deng R, Benckendorff P, Gannaway D. Learner engagement in MOOCs: Scale development and validation[J]. *British Journal of Educational Technology*, 2020, 51(1): 245-262.
- [8] Deng R, Benckendorff P, Gannaway D. Progress and new directions for teaching and learning in MOOCs[J]. *Computers & Education*, 2019, 129: 48-60.
- [9] Despujol I, Castañeda L, Marín V I, et al. What do we want to know about MOOCs? Results from a machine learning approach to a systematic literature map** review[J]. *International Journal of Educational Technology in Higher Education*, 2022, 19(1): 1-22.
- [10] Fox A. From moocs to spocs[J]. *Communications of the ACM*, 2013, 56(12): 38-40.
- [11] Haber J. MOOCs[M]. MIT Press, 2014.
- [12] Hew K F, Hu X, Qiao C, et al. What predicts student satisfaction with MOOCs: A gradient boosting trees supervised machine learning and sentiment analysis approach[J]. *Computers & Education*, 2020, 145: 103724.
- [13] Julia K, Marco K. Educational scalability in MOOCs: Analysing instructional designs to find best practices[J]. *Computers & Education*, 2021, 161: 104054.
- [14] Lambert S R. Do MOOCs contribute to student equity and social inclusion? A systematic review 2014–18[J]. *Computers & Education*, 2020, 145: 103693.
- [15] Liyanagunawardena T R, Adams A A, Williams S A. MOOCs: A systematic study of the published literature 2008-2012[J]. *International Review of Research in Open and Distributed Learning*, 2013, 14(3): 202-227.
- [16] Palacios Hidalgo F J, Huertas Abril C A, Gómez Parra M E. MOOCs: Origins, concept and didactic applications: A systematic review of the literature (2012–2019)[J]. *Technology, Knowledge and Learning*, 2020, 25(4): 853-879.
- [17] Stracke C M, Downes S, Conole G, et al. Are MOOCs Open Educational Resources? A Literature Review on History, Definitions and Typologies of OER and MOOCs[J]. *Open Praxis*, 2019, 11(4): 331-341.
- [18] Stracke C M, Trisolini G. A systematic literature review on the quality of MOOCs[J]. *Sustainability*, 2021, 13(11): 5817.
- [19] Wang W, Zhao Y, Wu Y J, et al. Factors of dropout from MOOCs: a bibliometric review[J]. *Library Hi Tech*, 2023, 41(2): 432-453.
- [20] Yousef A M F, Chatti M A, Schroeder U, et al. MOOCs-A Review of the State-of-the-Art[C]// *International Conference on Computer Supported Education*. SCITEPRESS, 2014, 2: 9-20.
- [21] Yu J, Luo G, **ao T, et al. MOOCCube: a large-scale data repository for NLP applications in MOOCs[C]// *Proceedings of the 58th annual meeting of the association for computational linguistics*. 2020: 3135-3142.