

Total quality management, service quality, and teaching effectiveness in Chinese universities: Basis for continuous improvement plan

Zhang, Hailing ✉

Graduate School, Lyceum of the Philippines University – Batangas (47130331@qq.com)



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Abstract

This study focused on the implementation of total quality management, service quality and teaching effectiveness of identified universities in China. A total of 450 respondents from Hetao University, Inner Mongolia University of Science and Technology, and Harbin Institute of Technology participated in this research. This study carried out a questionnaire survey and employed descriptive research method to gather data. The results showed majority of the respondents are female, who are connected with applied technology schools. The school implements total quality management (TQM), which ensures teaching effectiveness by controlling various elements affecting the teaching effectiveness and making it continuous. The implementation effect of total quality management was better. Teachers approved the quality of the school's services. Teachers have a high evaluation of the effectiveness of school teaching. Sex, age, educational background, and school type of teachers showed significant differences in the evaluation of TQM implementation level, service quality, and teaching effectiveness. There is a significant relationship between total quality management in education, school service quality, and teaching effectiveness. The better the total quality management and the higher the school's services, the better the teaching effectiveness of the school. Total quality management (TQM) and service quality variables have predictive effects on teaching effectiveness. The continuous improvement plan proposed in this research intends to improve the total quality management, service quality, and teaching effectiveness of identified universities.

Keywords: total quality management, service quality, teaching effectiveness, descriptive research methods, variable correlation

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1. Introduction

Total Quality Management (TQM) is an enterprise management concept, which emphasizes the whole process, all employees, and all-round participation in quality management (Li, 2020). It mainly includes quality concepts, quality systems, quality management, quality monitoring, quality evaluation, and so on. The theory was proposed by Feigenborg in the 1960s and matured through Deming's PDCA cycle, Juran's theory of mass (Ni, et. al., 2019), and Crosby's Zero defect theory. Total Quality Management (TQM) adheres to the principle of full staff, whole process, all-round and continuous improvement, and focuses on process management. It is a management tool based on the belief that quality is to meet customer requirements. According to the changing environment, improving organizational goals and gradually improving product quality are enhancing the reputation of universities (Pei, 2019).

University teaching involves many elements and links. Total quality management of teaching means that all functional departments, teaching units, teaching auxiliary institutions, training bases, and teachers and students of the school participate in the management, services, and activities of all aspects of teaching according to the functional division of labor and role positioning (Hu, 2018). Through the participation of all staff, the teaching operation carried out a full range of systematic quality management, and the teaching management carried out the whole process of quality control, to achieve a full range of teaching quality management. Finally, improve teachers' teaching quality and students' learning quality. Therefore, it can measure the implementation of education, including teaching operations, teaching quality management system, management mechanism establishment, quality culture construction, etc. (He, 2021).

The research on TQM mainly includes the theory and practice mode of TQM, the adaptability of TQM to education, the application of TQM in educational institutions, and the composition dimension of teaching quality insurance. In some schools implementing TQM, these are the problems: school teachers' TQM consciousness is weak, the concept is lagging, the enthusiasm of teachers is not high and cannot promote the development of TQM. Without full participation, the total quality management only stays at the level of teachers, does not involve students, and does not motivate students. Also, the quality of school education is not strictly assessed, teaching quality monitoring is not in place, and total quality management is not fully carried out, the teaching result is not satisfactory (Chen, 2018). To improve the teaching management level and promote the improvement of teaching quality, the researcher believes that it is necessary to implement TQM in higher education, carry out further in-depth research, explore the implementation path, quality management methods, and models of TQM in colleges and universities, and take specific measures to promote TQM in higher education. Measures to regulate various influencing factors promote total quality management must be taken to achieve greater results.

The quality view of higher education service holds that education service is an important output of higher education. The quality of higher education service is the overall result and embodiment of the quality of the whole teaching process. In general, studies can be conducted according to the degree to which the quality of teaching service meets the requirements of students' teaching objectives. Classroom teaching activities are often the core content of higher education teaching services, and classroom teaching quality is the core factor affecting the quality of teaching service (Huang, et. al., 2021). The quality of teaching ultimately depends on the needs of students. College students' evaluation of educational service quality affects the future development of schools (Zhang, 2020).

Quality management in colleges should be based on the participation of all staff and aim at the satisfaction of students, teachers, and all members of the school and society. Therefore, the quality of university management

services is very important. It mainly measures the service attitude, service quality, and service satisfaction of each teaching management institution to students, teachers, and related staff. The measurement of service quality can reflect the teaching service level of the teaching management organization (Yang, 2021).

The relevant research on the quality of education service mainly includes the theoretical research on the quality of higher education service, the influencing factors of the quality of education service, the assessment of the quality of service, and the satisfaction survey of the situation of education service (Tang, 2020). At present, some schools lack the concept of education service and do not attach importance to the real needs of students and society, resulting in inadequate service work of schools, affecting the quality of students trained, and some students' social knowledge and interpersonal skills are poor, which cannot meet the market demand. Some managers have weak consciousness of serving students and lack of attention to students' opinions. Moreover, the teaching hardware facilities of some schools are not complete, the quality of facilities needs to be improved, and the resources are limited, resulting in the quality of education services is not high.

To elevate the comprehensive strength and market competitiveness of the school, the school needs to continuously improve the quality of education services to meet the needs of talent training. Therefore, the researcher believes that it is necessary to further study the measures and implementation paths for the improvement of education service quality in colleges, explore the strategies to improve students' satisfaction with education service quality, and study the effective measures to improve quality awareness and service concept, to boost the improvement of school education service quality (Luo, 2021). With the change in the operating environment of higher education and the coming of the era of popularization, individuals in all walks of life have put forward higher requirements for the quality of school teaching and attach importance to the effect of education and teaching. The emphasis on the teaching effect of higher education is not only the inevitable development of the popularization of higher education but also the result of the increasing influence of higher education on scientific progress, international competitiveness, and social and personal development (Fan, 2018).

Whether the quality of the university running can be continuously improved depends on the completeness and effectiveness of internal quality management activities and systems. Through effective control of Influencing factors of teaching quality, the teaching effect is guaranteed (Wang, 2019). It involves all the activities of the college, involves all the staff of the school, and runs through the educational work of the whole school. It can comprehensively and objectively reflect the school's overall management of all aspects of teaching work.

In recent years, research on teaching quality has been carried out both at home and abroad, mainly covering such aspects as strategies for improving teaching effect, school culture construction, the relationship between organizational planning and teaching effectiveness, influencing factors for elevating teaching quality, and research on teaching quality management system and implementation strategies in colleges (Yang, 2019). At present, a few colleges have some dilemmas, such as backward teaching concepts, imperfect teaching management, insufficient scientific curriculum system, insufficient cutting-edge knowledge of course content, practical teaching to be improved, teachers' ability to be improved, and poor teaching effect, which affect the improvement of talent training quality.

Teaching quality is the cornerstone of university teaching development. Knowledge economy requires higher education innovation, and education internationalization demands higher education institutions to improve teaching quality. Therefore, the researcher believes that it is necessary to deeply study the elements that affect the quality of teaching and improve the quality of education by adjusting the influencing factors. In-depth research on the specific measures of good teaching management, the way of teaching system construction, classroom teaching, and teaching reform implementation path, to promote the continuous improvement of teaching operation and the continuous improvement of teaching quality (Yuan, 2018). According to the state of Chinese higher education, this study focused on the total quality management, teaching service, and teaching quality of selected colleges and universities, analyzed the existing problems, and tried to propose a continuous

improvement plan.

Objectives of the Study - This paper aimed to determine the implementation of total quality management, service quality, and teaching effectiveness in some schools and universities in China. Specifically, determined the level of implementation of the total quality management system to identify universities; to determine the level of service quality of tertiary institutions; investigate the level of teaching effectiveness in universities; test significant differences in responses of the schools of universities in TQM; test the degree of relationship among the three variables in this study such as TQM implementation, service quality, and teaching effectiveness; to investigate the predictor of teaching effectiveness between variables total quality management system and service quality. Finally, based on the results, it aimed to propose a continuous improvement plan for the universities.

2. Methods

Research Design - The researchers used descriptive research methods in this study. The relationship between three main variables total quality management in education, school service quality, and teaching effectiveness will also be examined. Descriptive research is a design that uses observation, questionnaire survey, interview, and other methods to objectively record and truly describe the problems and facts of educational phenomena. It is a research method used to describe the characteristics of the phenomena being studied, to have a fuller understanding of the phenomena being studied, and to provide clues for further investigation and research (Guo, 2019). In the research, descriptive methods are used to collect relevant information through standardized questionnaires, and then the relationship between variables is analyzed to find the result of the problem.

Participants of the Study - This study applied the purposeful sampling method. The participants involved are teachers from Hetao University, Inner Mongolia University of Science and Technology, and Harbin Institute of Technology. The sample respondents will include teachers from applied technology, applied research, and academic research schools. According to the statistics of the human resources department of these institutions, Hetao University has 856 full-time teachers. At present, Inner Mongolia University of Science and Technology has 708 full-time teachers. Harbin Institute of Technology has 956 full-time teachers. Using with 95% confidence interval and 5% margin of error, the ideal number of respondents was determined, and the sample size of target respondents was 450. With the help of statisticians, statistical random sampling is carried out on these target survey subjects.

Instruments of the Study - In this study, a survey questionnaire was used to collect data. The target of the questionnaire was teachers of Hetao University, Inner Mongolia University of Science and Technology, and Harbin Institute of Technology so these teachers gave data based on their perspectives.

The questionnaire consisted of five parts: The first part covers the basic information of the respondents, including gender, age, and education level. The second part is about the demographic profile of the institution where the teachers were connected such as academic research type, applied technology type, and professional skills type; Part 3 of the questionnaires is on the implementation of total quality management in education with 20 items, in terms of strategic plan and vision, quality management system and quality responsibility, teaching information collection and teaching guarantee. Part 4 of the questionnaire covers the quality of the school's services with 20 items, while part 5 was on teaching effectiveness, in terms of talent cultivation, teaching management, teaching operations and reforms, teaching quality control, and graduate studies and employment tracking with 29 items. The items of the questionnaires were adopted from the studies of various authors. The items were self-structured to suit the requirements of the objectives of the present study.

The questionnaire had a 4-level Likert scale: strongly agree; agree; disagree; strongly disagree. In addition, the validity and reliability of the questionnaire were evaluated. As a test for the preliminary study, the researchers tested 30 teachers with a questionnaire to determine its validity. With the results of the preliminary test,

Cronbach's alpha was used to evaluate the reliability of the questionnaire in the later stage.

Data Gathering Procedure - To collect research data, the researchers needed to contact the relevant school teaching administration in advance, and after approval, the questionnaire will be distributed to the teachers of the sampled applied technology, applied research, and academic research schools. It was completed using an online questionnaire, so respondents were free to choose according to the school situation. The distribution and collection of data will be carried out by the researchers themselves. The collected data will be checked to guarantee the validity of the questionnaire.

Data Analysis - The collected data were analyzed using the following statistical methods. Frequency was the basic information used to describe the interviewee. Composite Mean was used to show the average response of respondents on the indicator for each variable, the implementation of total quality management, service quality, and teaching effectiveness. For the P-value, data were grouped according to the type of university, which was used to measure the significant differences in the responses of different universities in terms of TQM implementation level, service quality, teaching effect, etc. Spearman's rho was used to explore the implementation of total quality management, service quality, and teaching effectiveness in some universities in China and identified significant relationships between TQM implementation, service quality, and teaching outcomes.

Ethical Considerations - To assure the confidentiality of the research data, the teachers surveyed remained anonymous throughout the research process, and the questionnaires were completed voluntarily by the participants. The statistical data collected in this questionnaire survey are all raw. In addition, this paper was approved by the LPU University Ethical Review Committee.

3. Results and discussion

Table 1

Summary Table on the Implementation of Total Quality Management in Education

Indicators	Weighted Mean	Verbal Interpretation	Rank
1.Strategic plan and vision	3.43	Implemented	1
2.Quality management system and quality responsibility	3.37	Implemented	4
3.Teaching information collection and feedback	3.41	Implemented	2
4.Teaching guarantee	3.38	Implemented	3
Composite Mean	3.40	Implemented	

Legend: 3.50 – 4.00 = Fully Implemented; 2.50 – 3.49 = Implemented; 1.50 - 2.49 = Slightly Implemented; 1.00 – 1.49 = Not Implemented

The results show that the strategic plan, as the most important top-level design, leads the development of colleges and universities in the implementation of TQM. Moreover, the school effectively transmits the development plan to teachers and students, which is in line with the history and development status of the school, and teachers and students agree with the development plan of the school. This finding validates the view of Geng (2020). Schools need to put strategic planning into action guided by strategic planning and vision and implement development plans in teaching, management, supervision, logistics, and other aspects of the school to ensure the realization of development goals. Ranked second is the content of Teaching information collection and feedback which means that the school collects teaching information and effectively supervises daily teaching work. The school quality management system has an audit system and a regular inspection system to control the teaching work that does not meet the regulations and strictly implement teaching management.

This finding validates the viewpoint of Zhang (2020). By analyzing teaching quality information, problems in teaching should be timely feedback, checked, and proposed improvement measures to improve work, achieve quality standards, achieve quality objectives, and promote the improvement of teaching quality. The average score for "Teaching guarantee" is 3.38. The ranking is low which implies that various teaching safeguard measures are the basic conditions to ensure the stable operation of teaching, and are very important for the normal development of school teaching work. Therefore, schools should increase funding investment, improve

basic teaching facilities, establish a total quality management guarantee mechanism with salary incentives and performance appraisal as the main content, and schools should actively train teachers to achieve professional development of teachers, improve teachers' teaching ability, and provide good teaching guarantee for classroom teaching.

Shi, et. al., (2023) proposed that the quality assurance system of colleges and universities should not only lay emphasis on the construction of resources but also emphasize the effective allocation and management of resources, to ensure that the stock resources are fully utilized in the training of talents. The average score for "Quality management system and quality responsibility" was 3.37. The results show that strengthening the construction of a quality management system can promote the effective operation of school teaching management. Therefore, the school should further strengthen the quality responsibility system, clarify the quality responsibility of faculty and staff, establish work orders, and strive to create a quality culture atmosphere. There should be a regular inspection system to check all aspects of teaching activities, to supervise the guarantee of teaching resources; and to control the teaching work that does not meet the regulations.

Zhang (2020) proposed that the information and data obtained by monitoring are the key factors in evaluating the effectiveness of teaching, and the evaluation results can judge the effectiveness of the operation of the quality system.

Table 2

Summary Table on the Quality and Level of the School's Services

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Teaching management and service	3.40	Agree	1
2. Student management and services	3.39	Agree	2
3. Teaching support service work	3.32	Agree	3
Composite Mean	3.37	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 - 2.49 = Disagree; 1.00 – 1.49 = Strongly Disagree

Table 2 covers the content of “the quality and level of the school's services”, the composite mean is 3.37, indicating that the respondents evaluated it as agreed. Among the cited items, "Teaching management and service" had the highest weighted average score of 3.40. The results show that teaching management is the basic work to ensure the normal development of teaching work, and teaching management and service quality are the key factors to enhance the competitiveness of schools. According to the requirements of the new situation and the actual situation of the university, colleges, and universities standardize teaching management, realize the standardization, institutionalization, and scientific teaching management, effectively improve the management level, and enhance the satisfaction of students by improving their service quality.

The teaching service level is the embodiment of the quality of teaching links in the teaching process. Schools should formulate educational management objectives and focus on serving teachers and students. School staff can provide teaching services for students, and teachers have solid professional knowledge to enhance teaching quality (Yang, 2021).

The average score for “Student management and services” was 3.39. In terms of student management and service, the school has established the concept of "student-cored“ and provides information and guidance services for students through a series of organizational and management measures. The school organizes and carries out rich campus culture and summer activities to cultivate students' volunteer service spirit and help students grow. The school organizes and carries out student service activities to help students cultivate entrepreneurial awareness, improve professional quality, and give students individual attention, focusing on providing students with better services, improving service awareness, and improving management service levels (Xu, 2019).

The average score for "Teaching support service work" was 3.32, the lowest score. With the development of society, students' requirements for the quality of teaching service in colleges and universities are not only

confined to the single element of classroom teaching quality. Besides classroom teaching, other teaching service elements provided by schools will also play a key factor in the quality of higher education service. Students have higher requirements for school logistics, books, dormitories, and other services. Therefore, the school should continuously improve the professional quality of the service staff, refine the work process, and provide good service work for students. Meanwhile, it is essential to increase capital investment, strengthen the construction of basic conditions such as teaching hardware facilities and sports equipment, improve the conditions of schools, and provide a guarantee for service work. The school should carry out the teaching equipment and facilities, library resources, campus environment, geographical location, transportation conditions, logistics services, and so on, improve the quality of teaching auxiliary work services, and enhance students' satisfaction (Yang, 2021).

Table 3

Summary Table on School Teaching Effectiveness

Indicators	Weighted Mean	Verbal Interpretation	Rank
1.Talent Cultivation	3.20	Agree	8
2.Teaching Management	3.26	Agree	4
3.Teaching operation and reform	3.32	Agree	1.5
4.Teaching quality control	3.17	Agree	9
5.Graduate studies and employment tracking	3.24	Agree	6
Composite Mean	3.24	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 - 2.49 = Disagree; 1.00 – 1.49 = Strongly Disagree

Table 3 covers the content of “school teaching effectiveness”, the composite mean is 3.34, indicating that the respondents evaluated it as agreed. The average score for "Teaching Management" was 3.26. In the aspect of teaching management, school teaching management is scientific, orderly, and normative. The school has a sound teaching management system, with a reward mechanism for outstanding teachers, and disciplinary actions against teachers who violate school rules, to ensure teachers' input in teaching work and improve teaching quality. Teaching quality management advocates the implementation of "all-factor management" and "whole-process management" for teaching quality. Teaching quality management is not only a nuclear cornerstone to ensure continuous and effective investment in teaching development but also a kernel guarantee to comprehend the basic task of teaching organization and pass muster the requirements of society (Xu, 2019). The implementation of instructional innovation in colleges is conducive to deepening curriculum reform, significantly improving students' learning interest and motivation, self-efficacy, learning time and energy investment, and academic satisfaction (Chen, 2021).

Graduate studies and employment tracking scored 3.24. The results show that the school has established a feedback system for graduates' academic follow-up survey, which focuses on the evaluation of students' employment work and the evaluation of graduates' quality, it can be familiar with the students who should have the ability. The establishment of a graduate employment tracking investigation mechanism, evaluating students' graduation requirements, and understanding the degree of students' knowledge and skills and social needs match. Universities should attach importance to the information feedback of employers and graduates to colleges and universities after graduates leave school, establish a reasonable and effective feedback mechanism, and constantly improve the quality assurance system of student education according to the feedback information, to improve the effectiveness of teaching security.

Alumni are the most direct achievements of education and the most valuable external resources for the progress of colleges. Alumni can promote the improvement of the whole process of personnel training. Schools should attach importance to the work of alumni and make use of alumni resources to enhance the development of universities (Wu, 2023). Meanwhile, Talent Cultivation obtained a score of 3.20, a bit low. Talent cultivation has always been the core mission of higher education. The orientation and mode of talent training are very important to the teaching work in colleges. In terms of personnel training, the school should determine the goal of talent training, and have a clear mode of personnel training according to the current situation of running a school. According to the development orientation of the school, the personnel training objectives are formulated adjusted,

and optimized regularly. Guo (2023) proposed that talent cultivation is the core issue of high-quality undergraduate education. Schools should make clear the orientation, objectives, specifications, knowledge, ability, and quality structure of their talent training scientifically and reasonably, and coordinate the current adaptability and long-term adaptability. Teaching quality control was scored low as well, with 3.17. The survey results show that schools should establish a teaching monitoring system and set up teaching supervision to supervise, inspect, evaluate, and guide the school's teaching order, teaching process, teaching quality, teaching management, and teaching job status. Regular inspection and evaluation of key teaching jobs, supervision of teaching operation.

Teaching quality monitoring is the implementation of comprehensive and systematic monitoring of school teaching work, teaching management and teaching process, effective supervision, and inspection of teaching quality, to advance quality improvement. Teaching supervision is a professional work process that standardizes teaching management, maintains teaching order, inspects, evaluates, and guides teaching, and is the key component of the teaching management and monitoring system (Wang, 2022).

Table 4

Relationship Between Implementation of Total Quality Management in Education and Quality and Level of the School's Services

Strategic plan and vision	rho-value	p-value	Interpretation
Teaching management and service	.778	0.000	Highly Significant
Student management and services	.790	0.000	Highly Significant
Teaching support service work	.822	0.000	Highly Significant
Quality management system and quality responsibility			
Teaching management and service	.778	0.000	Highly Significant
Student management and services	.828	0.000	Highly Significant
Teaching support service work	.828	0.000	Highly Significant
Teaching information collection and feedback			
Teaching management and service	.834	0.000	Highly Significant
Student management and services	.871	0.000	Highly Significant
Teaching support service work	.765	0.000	Highly Significant
Teaching guarantee			
Teaching management and service	.885	0.000	Highly Significant
Student management and services	.814	0.000	Highly Significant
Teaching support service work	.807	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 4 illustrates the relationship between the Implementation of total quality management in education and the Quality and Level of the School's Services. It was observed that the computed rho-values indicate a strong direct correlation, and the resulting p-values were less than the alpha level. This means that a significant relationship exists and implies that the better the implementation, the better the quality. The implementation of total quality management in schools refers to a management approach that focuses on teaching quality, takes the participation of all teachers and students as the basis, and makes comprehensive and systematic management of the whole process and various factors affecting teaching quality by the comprehensive use of management technology by all staff of the school, to make students satisfied and the society benefit. The total quality management system establishes the idea of "taking students as the center and serving students", pays attention to serving students, and constantly adjusts and improves the strategic direction, school-running mode, and teaching means of the school according to the requirements of students and based on comprehensive consideration of various factors, so that the service quality can meet the requirements of students as much as possible. In the process of total quality management, the school has an audit system and a regular inspection system to effectively supervise the daily teaching work and ensure that the staff provides good teaching services for students. Therefore, the better the strategic plan of the total quality management system is formulated scientifically, the teaching safeguard measures are perfect, and the better the overall implementation of the total quality management system is, the higher the quality of teaching services provided to students. The level of teaching service is the overall result of the quality of teaching links. Under normal circumstances, it can be

measured according to the degree of teaching service quality to satisfy the requirements of students' teaching and learning objectives. The total quality management system can provide good teaching services through whole-staff, whole-process, and all-round teaching quality management (Yang, 2021).

Table 5

Relationship Between Implementation of Total Quality Management in Education and School Teaching

Effectiveness

Strategic plan and vision	rho-value	p-value	Interpretation
Talent Cultivation	.804	0.000	Highly Significant
Teaching Management	.803	0.000	Highly Significant
Teaching operation and reform	.820	0.000	Highly Significant
Teaching quality control	.737	0.000	Highly Significant
Graduate studies and employment tracking	.763	0.000	Highly Significant
Quality management system and quality responsibility			
Talent Cultivation	.834	0.000	Highly Significant
Teaching Management	.813	0.000	Highly Significant
Teaching operation and reform	.862	0.000	Highly Significant
Teaching quality control	.802	0.000	Highly Significant
Graduate studies and employment tracking	.789	0.000	Highly Significant
Teaching information collection and feedback			
Talent Cultivation	.846	0.000	Highly Significant
Teaching Management	.822	0.000	Highly Significant
Teaching operation and reform	.855	0.000	Highly Significant
Teaching quality control	.850	0.000	Highly Significant
Graduate studies and employment tracking	.801	0.000	Highly Significant
Teaching guarantee			
Talent Cultivation	.828	0.000	Highly Significant
Teaching Management	.828	0.000	Highly Significant
Teaching operation and reform	.808	0.000	Highly Significant
Teaching quality control	.730	0.000	Highly Significant
Graduate studies and employment tracking	.730	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 5 presents the association between the Implementation of total quality management in education and school teaching effectiveness. It was observed that the computed rho-values indicate a strong direct correlation, and the resulting p-values were less than the alpha level. This shows that a significant relationship exists and implies that the better the implementation, the better the school's teaching effectiveness. Total quality management (TQM) refers to the systematic management of various elements that influence the quality of teaching using the method of full staff participation, this can guarantee the improvement of teaching quality. Through the participation of everyone in the generation of teaching quality, the quality management of the integral process of teaching operation, and the quality control of the integral course of teaching management, the teaching total quality management of all staff is realized, the teaching quality is guaranteed to meet the standards of teaching quality, and finally, the overall improvement of the learning quality of students is promoted.

In the progress of total quality management, the school has established a strict work order, established a quality responsibility system, and required teachers to fulfill their responsibilities for quality responsibility, carry out various teaching inspections, propose improvement measures according to the feedback of teaching problems, supervise the implementation of various quality improvement measures, and enhance the promotion of teaching quality. And by providing the necessary teaching infrastructure, establishing a perfect talent training fund investment system, improving teachers' teaching ability, and other measures to ensure the promotion of teaching quality. Therefore, the school has a reasonable vision for running a school, strict implementation of quality management, effective supervision and feedback, perfect safeguard measures, and full and comprehensive implementation of TQM. The better the implementation of the TQM system, the more able it is to enhance teaching quality, improve teaching effectiveness, and ensure the quality of talent training.

Pei (2019) proposed that the main reason why universities should devote themselves to teaching quality

management is to continuously improve teaching quality. Total quality management system through the whole staff, the whole process, and the full range of teaching quality management, to ensure that the quality of education meets the requirements of students as much as possible.

Table 6*Relationship Between Quality and Level of the School's Services and School Teaching Effectiveness*

Teaching management and service	rho-value	p-value	Interpretation
Talent Cultivation	.856	0.000	Highly Significant
Teaching Management	.854	0.000	Highly Significant
Teaching operation and reform	.855	0.000	Highly Significant
Teaching quality control	.827	0.000	Highly Significant
Graduate studies and employment tracking	.820	0.000	Highly Significant
Student management and services			
Talent Cultivation	.907	0.000	Highly Significant
Teaching Management	.876	0.000	Highly Significant
Teaching operation and reform	.913	0.000	Highly Significant
Teaching quality control	.870	0.000	Highly Significant
Graduate studies and employment tracking	.849	0.000	Highly Significant
Teaching support service work			
Talent Cultivation	.907	0.000	Highly Significant
Teaching Management	.876	0.000	Highly Significant
Teaching operation and reform	.877	0.000	Highly Significant
Teaching quality control	.774	0.000	Highly Significant
Graduate studies and employment tracking	.795	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 6 displays the association between the quality and level of the school's services and school teaching effectiveness. The computed rho-values indicate a strong direct correlation, and the resulting p-values were less than the alpha level. This reveals that a significant relationship exists and implies that the better the quality, the better the school's teaching effectiveness. The quality of higher education service refers to the extent to which universities take advantage of educational facilities and technologies to provide products for the overall development of students, to achieve their student requirements.

In the service work, the university has formulated educational management objectives, served teachers and students, and established a culture concept of teaching quality. The faculty and staff actively provide students with teaching services and related services such as information and guidance and provide basic hardware conditions and logistics services such as book resources, network, and teaching facilities required for teaching to guarantee the orderly development of teaching work. Hence, the school's teaching management and service are perfect, the student management is strict, the student service work is comprehensive, the teaching auxiliary service work is in place, and the service work is good in a full-process way, providing a good guarantee for the teaching operation and teaching management. The better the service quality, the more able to improve the teaching effectiveness, and improve students' knowledge and comprehensive quality.

Yang (2021) proposed that the elements affecting the quality of higher education include the content of educational services. Students' requirements for the quality of teaching service have long gone beyond the single element of course teaching quality. In addition to classroom teaching, other teaching service elements provided by schools will promote the improvement of the teaching service level. There is a relationship between the teaching service level offered by schools and the quality of teaching, and the mass of educational services offered by the university is represented by the combination of hardware facilities and software services provided by the university.

Multiple regression was run to predict school effectiveness from the implementation of total quality management in education and the quality and level of the school's services. These variables statistically significantly predicted productivity, $F(7,442) = 587.642$, $p < .0000$, $r^2 = 0.9043$. However, upon scrutiny of the data, only quality management systems and quality responsibility were not considered a predictor. Thus, it was

concluded that the remaining six variables were it was added statistically significantly to the prediction, $p < 0.05$.

Table 7*Predictors of School Teaching Effectiveness*

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Interpretation
	B	Std. Error	Beta			
(Constant)	.174	.053		3.299	.001	
Strategic plan and vision	.089	.034	.096	2.593	.010	Significant
Quality management system and quality responsibility	-.059	.041	-.066	-1.442	.150	Not Significant
Teaching information collection and feedback	.267	.041	.280	6.585	.000	Highly Significant
Teaching guarantee.	-.097	.036	-.107	-2.685	.008	Significant
Teaching management and service	.193	.041	.202	4.689	.000	Highly Significant
Student management and services	.320	.043	.348	7.402	.000	Highly Significant
Teaching support service work	.232	.032	.255	7.185	.000	Highly Significant

Legend: $F_{(7,442)} = 587.642$; $p < 0.000$; $r^2 = 0.903$

Strategic planning is the compass of the development of the school; it establishes the development direction and goals of the school, and puts forward specific tasks and measures, which is an important guide for the progress of the school cause. As the most important top-level design of university development, university strategic planning has a direct relationship between its management ability and level and the cultivation of talents and has a direct influence on the effectiveness of teaching. The school collects teaching data and information, effectively supervises the daily teaching work, and timely feedback on the evaluation results to the corresponding departments, so that they can check and improve their work, this can meet the teaching requirements; The Teaching guarantee is the material basis of talent training, providing support for personnel training, ensuring the support of quality elements such as teaching staff and teaching funds, carrying out teaching job and improving teaching state; The role of teaching management is to promote the realization of the management function of the plan by the method of teaching theory, coordination and control, and coordinate the elements of the teaching course to make it run in an orderly manner. Therefore, strict teaching management has a catalytic effect on improving teaching effectiveness; The school organizes and carries out student service activities and campus cultural activities, provides students with information and guidance services, does a good job in student management, encourages students to form study habits, have good comprehensive literacy, and improve teaching quality; Hardware resources such as human and other resources, which affect the quality of education and teaching, are the basic conditions to guarantee the operation of teaching. Schools are well done in teaching auxiliary services to guarantee the orderly development of teaching operations. Therefore, the six variables of strategic planning, teaching information collection and feedback, teaching support, teaching management and service, student management and service, and teaching auxiliary service have predictive effects on teaching effectiveness.

Luo (2020) proposed that teaching quality is directly or indirectly related to the teaching environment, teaching input, the number of books owned, classroom area, training program formulation, teaching implementation, teaching information collection, quality control, teaching evaluation, student service, and other factors, and these factors are the key factors for school construction and development. Teaching quality is affected by organizational factors such as teaching subjects and teaching management systems. Among them, the root factors are the vision of school leaders and school development strategy, and the influence of hardware and software facilities is relatively high. Xu (2018) proposed that teachers' teaching quality is affected by organizational factors such as teaching subjects and teaching management systems, and is also related to factors such as teaching facility foundation, teaching philosophy, school study style construction, internal and external environment, etc.

Proposed Continuous Improvement Plan for Chinese University

This study provides a comprehensive continuous improvement plan for Chinese universities across various key result areas and objectives. The plan encompasses initiatives to enhance total quality management in education, improve the quality and level of the school's services, and enhance school teaching effectiveness. Under the implementation of total quality management in education, strategies include developing a scientifically and reasonably school philosophy, strengthening school culture construction, improving the teaching feedback mechanism, and enhancing the funding guarantee mechanism for personnel training. Each strategy is accompanied by specific key performance indicators and the responsible persons.

The plan also addresses the quality and level of the school's services, focusing on areas such as teaching management and service, student management and services, library services, and teaching support services. Initiatives include standardizing service mechanisms, improving teaching support, and strengthening library resources and services. Furthermore, the plan aims to enhance school teaching effectiveness through initiatives such as strengthening cooperation with enterprises, establishing reward and punishment systems for teachers, implementing teaching evaluation, and improving students' academic-level testing system. Additionally, the plan emphasizes alumni engagement and strengthening teaching quality control and talent cultivation. Each objective is accompanied by specific strategies, key performance indicators, and the responsible persons or departments. Overall, the continuous improvement plan outlines a comprehensive approach to enhancing various aspects of Chinese university education, from quality management to service provision and teaching effectiveness.

4. Conclusions and recommendations

Majority of the respondents are female, 31-40 years old, graduate degree. Among the respondents, 30.9% are academic research schools, 41.8% are applied technology schools, and 27.3% are professional skills schools. Most of the respondents were applied technology schools. The respondents agree with the total quality management of the school. At the same time, the strategic plan and vision are given a high degree of recognition, and the quality management system and quality responsibility are given the lowest assessment. Respondents have agreed to the school's services in terms of teaching management and service, student management and services, and teaching support service. Among the three indicators, respondents have a higher evaluation of teaching management and service and the lowest evaluation of teaching support service work. Respondents agree with the teaching effectiveness of the school, especially the teaching operation and reform of the school, but, the lowest evaluation of teaching quality control. Teachers' sex, age, educational background, and school type have significant differences in the evaluation of TQM implementation level, service quality, and teaching effectiveness. There is a significant relationship between total quality management in education, school services, and teaching effectiveness. The better the total quality management in education and the higher the school's services, the better the teaching effectiveness of the school. The six dimensions of total quality management system and service quality variables, namely strategic planning, teaching information collection and feedback, teaching support, teaching management and service, student management and service, and teaching auxiliary service, are predictors of teaching effectiveness. A continuous improvement plan of the university is put forward to improve the total quality management, service quality, and teaching effectiveness of the school.

The administrative departments of colleges and universities may take a series of effective measures to strengthen the awareness of the quality responsibility of the faculty and staff, lay emphasis on the training of the awareness of the responsibility of the staff and administrative staff engaged in teaching auxiliary services, and strengthen the quality responsibility of the faculty and staff, to promote the teaching quality. University teachers may set up the concept of student-centered teaching, implement classroom teaching reform, pay attention to teaching research, actively participate in professional training, improve professional technical ability and teaching level, carry out good teaching service for students, and constantly improve teaching quality. Local government leaders may lead and support the school-enterprise cooperation between universities and enterprises. It can formulate strategic plans for school-enterprise cooperation, improve relevant laws and regulations and

cooperation mechanisms, organize and coordinate cooperation between institutions of higher learning and enterprises, promote exchanges and cooperation, and provide needed services for schools and enterprises. University administrators or principals may conduct a comprehensive evaluation of schools according to the research on total quality management, service quality, and teaching effectiveness. Future researchers may conduct surveys of student respondents and conduct studies to determine student evaluations of the school's total quality management, service quality, and teaching effectiveness. The continuous improvement plan formulated may be used as reference by schools.

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