

Article

Research on Optimization Methods of Multi-Dimensional Assessment and Evaluation Mechanism for Faculty in Science and Engineering Universities

Xiaole Duan^{1,*}, Lu Wang¹, Jiayu Chen¹, Dong Wang¹ and Chongyang Wu¹

¹ Xidian University, Xi'an, Shaanxi, 710071, China

* Correspondence: Xiaole Duan, Xidian University, Xi'an, Shaanxi, 710071, China

Abstract: In the context of strategic efforts to strengthen the education system and advance the science and technology sector, science and engineering universities play a central role as the core hubs for technological innovation and high-level talent development. The caliber of their faculty has a direct impact on enhancing national core competitiveness. To cultivate a high-quality, professional teaching workforce that is ethically grounded, skilled, balanced, and dynamic, it is essential to establish a scientific, precise, multi-dimensional, and efficient faculty evaluation system. This paper focuses on optimizing multi-dimensional faculty evaluation mechanisms, examining the necessity of improving such mechanisms within science and engineering universities, addressing the practical challenges currently faced, and exploring potential avenues for their optimization. The goal of this study is to provide theoretical insights and guidance for the development of exemplary educators in science and engineering universities.

Keywords: multi-dimensional assessment and evaluation mechanism; faculty; science and engineering universities

1. Introduction

In 2025, six government departments, including the Ministry of Education, issued the Guiding Opinions on Strengthening the Construction of Young Faculty Teams in Universities in the New Era. This policy explicitly calls for universities to ensure that young faculty members can continuously adapt to the evolving demands of national strategies, technological advancements, and economic development. By reforming assessment and evaluation mechanisms, universities are encouraged to strengthen guidance and support for young faculty, thereby fostering their vitality. As the foundation for faculty recruitment, employment, promotion, and career development, the faculty assessment and evaluation mechanism plays a critical role in motivating faculty engagement and advancing their professional growth. However, some science and engineering universities face challenges within their faculty assessment and evaluation systems, such as an overemphasis on scientific research at the expense of teaching, and an undue focus on form rather than substance. These issues significantly hinder faculty development and the overall improvement of educational quality. Therefore, developing a scientific, efficient, and multi-dimensional faculty assessment and evaluation mechanism that meets the diverse professional development needs of faculty and fully leverages their potential in both teaching and research has become a pressing concern for science and engineering universities.

Published: 22 November 2025



Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

2. The Necessity of Optimizing the Multi-Dimensional Assessment and Evaluation Mechanism for Faculty in Science and Engineering Universities

2.1. The Fundamental Guarantee for Enhancing Educational Quality

Under the traditional, single-dimensional assessment and evaluation model, an excessive focus on research output has caused faculty in science and engineering universities to fall into the traps of being "paper-oriented" and "research-focused, teaching-neglected." This emphasis often leads teachers to prioritize publishing research papers over engaging in meaningful research exploration, enhancing teaching quality, or developing students' practical skills. Consequently, the balance between research and teaching is disrupted, with the latter being overlooked [1]. Constructing and optimizing a multi-dimensional faculty assessment and evaluation mechanism is crucial in shifting the focus of faculty evaluation from the sole pursuit of research papers to the broader goal of enhancing teaching effectiveness. By considering multiple aspects of faculty performance, such as teaching methods, student engagement, and instructional outcomes, this approach can provide a holistic understanding of faculty contributions. Furthermore, it allows for targeted professional development programs, continuous improvement in teaching practices, and, ultimately, an elevation in the overall quality of education.

2.2. An Important Means for Promoting Faculty Professional Development

Optimizing the multi-dimensional assessment and evaluation mechanism for faculty in science and engineering universities is not only essential for enhancing educational quality, but also serves as a key driver for faculty professional development. This mechanism allows for a comprehensive evaluation of faculty through various dimensions, including teaching achievements, pedagogical effectiveness, and research productivity. Such a model encourages faculty to transition from an overemphasis on research outputs to a more balanced focus that also recognizes their practical teaching abilities and student-centered outcomes. Moreover, by incorporating diverse evaluation methods-such as student feedback, institutional supervision, and peer assessments-universities can help faculty identify their strengths, recognize areas for improvement, and develop personalized professional growth plans. This multi-dimensional approach facilitates the simultaneous development of both research and teaching competencies, ensuring that faculty members are well-rounded educators capable of making significant contributions to both academic and student development [2].

3. Challenges Faced by the Multi-Dimensional Assessment and Evaluation Mechanism for Faculty in Science and Engineering Universities

3.1. Evaluation Content: "Emphasizing Scientific Research While Neglecting Teaching"

In many science and engineering universities, faculty assessment processes tend to prioritize research achievements, particularly the completion of research projects and the publication of academic papers. These elements often make up a significant portion of the overall evaluation criteria, prompting faculty members to direct the majority of their efforts toward research tasks. As a result, teaching responsibilities and the quality of education are sidelined, which undermines the core mission of universities-fostering the moral and intellectual development of students [3]. This imbalance creates a situation where teaching effectiveness and the cultivation of practical skills in students are overlooked. Furthermore, research tasks are frequently tied to professional title promotions, creating short-term incentives for faculty to focus on easily quantifiable research activities. This trend can delay the development of teaching abilities and steer faculty away from the long-term goal of cultivating well-rounded professionals who possess both strong theoretical knowledge and practical engineering skills. Addressing this issue requires universities to develop a more balanced evaluation system that not only values research but also elevates the importance of teaching and student development.

3.2. Evaluation Indicators: "Emphasizing Quantity While Neglecting Quality"

Another major challenge within faculty assessment and evaluation mechanisms is the overemphasis on quantitative indicators, often at the expense of quality. For example, some science and engineering universities place considerable weight on the number of published papers as an evaluation criterion, while failing to assess the innovativeness or practical significance of the research outcomes. This focus on quantity encourages faculty members to prioritize the volume of their publications rather than the depth or originality of their work. In some cases, faculty may resort to repetitive studies that contribute little to technological innovation or the advancement of their field. A similar issue arises at the teaching level, where evaluation standards often emphasize student outcomes (such as exam results or graduation rates) without adequately considering the quality of the teaching process itself. Key aspects like teaching methods, student engagement, and the development of students' practical abilities are overlooked. As a result, the professional development of faculty is constrained, and the production of high-level, impactful teaching achievements is hindered [4]. To address this, universities need to adopt a more holistic approach to evaluation, one that considers both the quantity and quality of faculty's research and teaching contributions.

3.3. Evaluation Methods: "Emphasizing Form over Substance"

The assessment and evaluation mechanisms in some science and engineering universities are heavily reliant on standardized procedures and formalities, such as requiring faculty to repeatedly complete identical surveys. However, these methods often fail to conduct a thorough analysis of substantive achievements, such as innovations in teaching or breakthroughs in research. This results in faculty members focusing on fulfilling formal requirements rather than making meaningful improvements in their teaching and research practices. Such a system does not fully harness the potential of the assessment process to motivate or guide faculty development. Furthermore, many existing evaluation methods still place emphasis on whether faculty complete tasks, rather than assessing the quality of their performance. In many cases, self-evaluation remains the primary method of assessment, which can be subjective and may not provide an accurate picture of faculty contributions. This reliance on self-reporting undermines the effectiveness of the evaluation process and limits its ability to provide constructive feedback that can drive faculty improvement. To address this challenge, universities should explore more comprehensive and multi-faceted evaluation methods that incorporate feedback from students, peers, and administrators, and place greater emphasis on the actual impact of faculty's work [5].

3.4. Evaluation Support: "Emphasizing Form over Implementation"

A further challenge lies in the lack of effective support mechanisms for faculty assessment and evaluation in some science and engineering universities. In many cases, these mechanisms exist only at the policy level and are not properly implemented. Without clear accountability or adequate enforcement, faculty assessment often becomes a mere formality, failing to deliver tangible results. Inadequate follow-up and supervision of the evaluation process mean that faculty members may not receive the necessary feedback or support for professional growth. This lack of implementation undermines the potential for faculty assessment to act as a tool for development. Moreover, in some universities, the results of faculty evaluations are often handled in a superficial manner, with limited attention given to guiding faculty through deep reflection based on their assessment outcomes. Without opportunities for faculty to engage with the results meaningfully, the assessment process becomes ineffective in fostering real improvements in teaching and research. To address these issues, universities need to ensure that evaluation systems are backed by strong support mechanisms, including clear guidelines

for the implementation and follow-up of assessments, as well as structured opportunities for faculty to reflect on and act upon the feedback received.

4. Optimization Methods for the Multi-Dimensional Assessment and Evaluation Mechanism for Faculty in Science and Engineering Universities

4.1. Innovating Evaluation Concepts to Achieve Comprehensive Coverage of Evaluation Content

To optimize the multi-dimensional assessment and evaluation mechanism for faculty, science and engineering universities must first grasp the core objective of faculty evaluation-enhancing professional competence and promoting continuous development in teaching and research. A key step in this process is to establish an evaluation concept that supports the comprehensive improvement of faculty's skills and contributions. Universities should embrace a development-centered evaluation philosophy that focuses not only on rewards or punishments but also on nurturing the professional growth of faculty across all aspects of their work. This approach will help faculty members, whether junior or senior, to identify appropriate career development pathways and be encouraged to engage in both teaching and research innovation. The evaluation mechanism should not be narrowly focused on the completion of research tasks but should instead highlight the current performance and future potential of faculty members. By recognizing faculty members' intrinsic motivation for self-improvement and providing opportunities for sustained professional growth, universities can foster an environment that cultivates excellence. Furthermore, universities must ensure that the evaluation content is comprehensive, covering not just research but also professional ethics, teaching and education, social service, and career development. This holistic approach enables universities to assess faculty contributions in a more well-rounded manner. The weight of each evaluation component should be tailored according to the specific needs of different fields and job responsibilities. Such differentiation ensures that faculty in varied disciplines feel respected and valued for their unique contributions. Additionally, universities should keep the evaluation mechanism dynamic, regularly collecting feedback from students, faculty, and administrative staff, and adjusting the evaluation criteria accordingly to remain aligned with the evolving needs of professional development and educational quality enhancement.

4.2. Establishing a Classified Assessment System and Implementing Differentiated Evaluation

The establishment of a classified assessment system is essential to optimize faculty evaluation in science and engineering universities and to address the problem of "emphasizing quantity while neglecting quality." A differentiated evaluation approach based on faculty positions, disciplinary characteristics, and career stages is key to ensuring that faculty members are evaluated fairly and comprehensively in their respective areas of expertise. This initiative requires universities to move beyond the traditional one-size-fits-all model of evaluation, which often places equal emphasis on all faculty members regardless of their role or discipline. Instead, universities should delegate part of the evaluation authority to individual departments and colleges. By doing so, colleges and specific disciplines can design their own assessment rules within the broader framework set by the university, thus enhancing the relevance and feasibility of the evaluation indicators. These rules should reflect the specific needs and developmental goals of each field. Additionally, universities should establish clear, position-based evaluation standards that are tied to the responsibilities of each faculty member. Such standards should be applied consistently across annual evaluations, appointment-term assessments, and professional title promotions. This position-based approach ensures that faculty members are assessed in alignment with their actual duties, fostering a more personalized evaluation experience. A dynamic adjustment mechanism is also critical to the success of the classified assessment system. Universities should set up evaluation committees to track the effectiveness of the classified assessments and gather feedback regularly from

faculty. Any identified issues should be addressed in a timely manner, with necessary adjustments made to ensure that the evaluation system remains responsive to faculty development needs and institutional goals. Over time, this will establish a robust and adaptive evaluation system that enhances the overall quality of the faculty.

4.3. Exploring Diversified Evaluation Methods to Build a Multi-Dimensional Evaluation System

The optimization of the faculty assessment and evaluation mechanism should be grounded in a multi-dimensional approach that incorporates diverse methods of evaluation to fully capture faculty contributions in teaching, research, and professional development. A primary aspect of this approach is the refinement of the student evaluation system. Students, as the core beneficiaries of teaching, are well-positioned to provide valuable feedback on faculty performance. However, to make this feedback more reliable and valid, universities must implement a combination of online and offline evaluation methods, conducting evaluations regularly throughout the academic year. This ensures that evaluations are not based on a single point in time, reducing the risk of random errors and enhancing the overall objectivity of the results. Furthermore, universities should actively promote the idea that student participation in evaluations is both a right and a responsibility, thus encouraging more meaningful and engaged feedback from students. The results of these evaluations should be integrated into faculty development programs, providing faculty members with insights into their strengths and areas for improvement.

In addition to student evaluations, universities should establish a robust peer evaluation system. Peer evaluation is widely recognized as a valuable method for assessing academic competence and teaching effectiveness. In science and engineering universities, this approach can be especially beneficial in evaluating research quality and teaching innovation. Universities should establish clear criteria for selecting peer reviewers, prioritizing individuals who demonstrate academic rigor, professional ethics, and a strong standing in their field. Peer reviewers can include senior faculty members, recognized experts in the discipline, or external scholars with expertise in the relevant areas. To ensure fairness and objectivity, peer evaluation should be conducted according to carefully defined standards, which should be tailored to the specific roles and responsibilities of faculty members. This ensures that the evaluation process is aligned with the characteristics of different faculty positions, fostering a more personalized and effective evaluation system.

4.4. Improving Support Mechanisms to Ensure the Effective Implementation of Long-Term Assessments

One of the critical goals of optimizing the faculty assessment and evaluation mechanism is to shift from a "short-term quantification" model to one that focuses on "long-term empowerment." This shift requires universities to strengthen the supporting mechanisms that underpin the assessment system, ensuring that long-term assessments are effectively implemented. Regular evaluations should be conducted to collect data on faculty performance in research, teaching, and other professional activities. This data can be gathered through faculty interviews, surveys, and advanced monitoring systems that track faculty performance over time. Both qualitative and quantitative evaluation methods should be employed to provide a comprehensive assessment of faculty contributions. Based on this data, universities can adjust their evaluation criteria to better reflect faculty development goals and institutional priorities.

Furthermore, the success of long-term assessments relies on a strong feedback mechanism. Universities must establish clear, transparent channels for communicating evaluation results to faculty members. Feedback platforms such as internal websites or communication tools like WeChat can be used to ensure that faculty receive timely, detailed information about their evaluation results. This allows faculty to reflect on their

performance, identify areas for improvement, and develop targeted professional development plans. Regular feedback ensures that faculty have the support and guidance they need to continuously improve their skills and advance their careers.

5. Conclusion

In conclusion, faculty members are the cornerstone of any educational institution, serving as the driving force behind the development of students and the advancement of academic programs. The establishment of a robust multi-dimensional assessment and evaluation system is, therefore, a pivotal aspect of modern educational reform. Such a system is essential for enhancing the capacity of faculty to contribute to student development, improving the quality of teaching, and fostering the overall high-quality growth of universities. Given the complex and diverse roles that faculty members play in both teaching and research, it is crucial that their evaluation mechanisms be multidimensional, reflective of their contributions, and aligned with the overarching goals of the institution.

Science and engineering universities, in particular, face the challenge of balancing the demands of research excellence with the necessity of providing high-quality education. To address this, universities must take proactive measures, such as innovating evaluation concepts, optimizing evaluation content, establishing a well-structured classified assessment system, exploring diversified evaluation methods, and improving the supporting mechanisms that facilitate these processes. These measures will help eliminate the overemphasis on research tasks that often marginalizes teaching responsibilities, and will promote a more balanced approach where both teaching and scientific research are equally valued. This shift is particularly important in science and engineering disciplines, where integrating theoretical knowledge with practical skills is essential for preparing the next generation of professionals and innovators.

Moreover, by refining the multi-dimensional faculty assessment and evaluation mechanism, universities can effectively guide faculty to focus not only on enhancing classroom teaching and pedagogical skills but also on achieving breakthroughs in research and fostering the practical abilities of students. This approach helps to cultivate a vibrant academic environment where faculty are motivated to innovate, improve their professional skills, and contribute meaningfully to the development of their students and the advancement of knowledge. In doing so, the faculty's educational vitality and potential for innovation are fully activated, resulting in the nurturing of high-quality science and engineering talent that is equipped to meet the challenges of a rapidly evolving global landscape.

Ultimately, a well-optimized faculty evaluation system not only strengthens the individual capabilities of faculty members but also contributes to the broader goals of higher education-advancing teaching quality, enhancing research output, and ensuring that students are adequately prepared for the demands of both professional practice and lifelong learning. By moving toward a more comprehensive and balanced faculty evaluation system, science and engineering universities will continue to improve their educational standards, making meaningful contributions to the growth of society and the global knowledge economy. This forward-thinking approach will ensure that higher education remains adaptable, sustainable, and capable of meeting the needs of future generations.

References

1. N. Xia, and Y. Yang, "Comprehensive Evaluation for Teaching Quality of College Faculty," *International Journal of Emerging Technologies in Learning*, vol. 16, no. 18, 2021. doi: 10.3991/ijet.v16i18.25663
2. D. F. Baker, W. P. Neely, P. J. Prenshaw, and P. A. Taylor, "Developing a Multi-Dimensional Evaluation Framework for Faculty Teaching and Service Performance," *Journal of Academic Administration in Higher Education*, vol. 11, no. 2, pp. 29-41, 2015.

3. S. Chang, Y. Jing, and X. Ma, "Research on Multi-dimensional Teaching Evaluation of Teachers in Higher Colleges and Universities," In *4th International Conference on Humanities Science, Management and Education Technology (HSMET 2019)*, July, 2019, pp. 259-263. doi: 10.2991/hsmet-19.2019.46
4. A. Kumar, and R. Jain, "Faculty evaluation system," *Procedia Computer Science*, vol. 125, pp. 533-541, 2018. doi: 10.1016/j.procs.2017.12.069
5. R. C. Burkhart, "The Assessment Revolution: New Viewpoints for Teacher Evaluation," 1969.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). The publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.