

Talent Evaluation in Interdisciplinary Contexts: Problems and Countermeasures—A Case Study of Professor X at Southwest Jiaotong University (Postprint)

Authors: Zhu Weifeng

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Abstract

[Purpose/Significance] Interdisciplinary research is conducive to solving social problems, generating scientific research frontiers and major scientific breakthroughs, promoting technological innovation, and is also essential for disciplinary development. However, the current talent evaluation model in Chinese universities, which relies on hierarchical journal catalogues, prevents comprehensive evaluation of interdisciplinary research achievements, thereby affecting the assessment of scholars with such accomplishments. [Method/Process] Taking Professor X from the School of Mechanical Engineering at Southwest Jiaotong University as a case study, this paper analyzes the disciplinary and school distribution of the scholar's publications from two perspectives: their ranking in the university's journal hierarchy and their disciplinary orientation attribution, thereby revealing the contradictions between traditional journal catalogues and the evaluation of interdisciplinary research outcomes. [Results/Conclusions] Recommendations are proposed from four aspects: adopting more comprehensive evaluation methods for interdisciplinary journals, establishing multi-dimensional and flexible evaluation approaches, conducting multidisciplinary collaborative evaluations, and setting up interdisciplinary evaluation committees.

Full Text

Preamble

Research on the Problems and Countermeasures of Talent Evaluation under the Interdisciplinary Background: Taking Professor X of Southwest Jiaotong University as an Example

Zhu Weifeng
Southwest Jiaotong University Library, Chengdu 611756

Abstract: [Purpose/significance] Interdisciplinary research is conducive to solving social problems, generating scientific research frontiers, producing major scientific breakthroughs, and promoting scientific innovation, while also addressing the developmental needs of disciplines themselves. However, China's current talent evaluation model, which relies on classified catalogues of disciplinary journals, prevents comprehensive assessment of interdisciplinary research achievements, thereby affecting the evaluation of scholars with such accomplishments. [Method/process] Taking Professor X from the School of Mechanical Engineering at Southwest Jiaotong University as a case study, this paper analyzes the disciplinary and institutional distribution of the scholar's publications from two perspectives: the university's journal grading catalogue and the disciplinary orientation of the papers themselves, thereby revealing the contradictions between traditional journal grading catalogues and the evaluation of interdisciplinary research outputs. [Result/conclusion] The paper proposes recommendations from four aspects: adopting more sophisticated evaluation methods for interdisciplinary journals, establishing multi-dimensional and flexible evaluation approaches, conducting collaborative multidisciplinary evaluations, and setting up dedicated interdisciplinary evaluation panels.

Keywords: interdisciplinary research; classified catalogue of journals; talent evaluation; academic evaluation

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1. Introduction

With the continuous development of new technologies such as big data, solving increasingly complex major problems requires transcending traditional disciplinary boundaries. Problem-oriented scientific research is demonstrating a clear trend toward multidisciplinary integration and convergence, which represents an inevitable direction for disciplinary development in universities and constitutes an important pathway for generating innovative achievements [1]. Strengthening the integrated development of interdisciplinary research constitutes a key component of China's national initiative to advance the "Double First-Class" construction in higher education institutions [2].

Nevertheless, China's current research achievement evaluation system in universities creates uncertainty, intersectionality, and complexity regarding the attribution of outputs produced through interdisciplinary research [3]. To accelerate the construction of world-class universities and disciplines, universities primarily

employ academic journal and achievement grading catalogues to evaluate faculty research outputs. Through institutional investigations, the author found that Sichuan University [4] implements two separate rating schemes for professional title evaluation—one for humanities and social sciences, and another for science, engineering, and medicine. Zhejiang University [5] utilizes its academic journal grading catalogue as a critical basis for reviewing faculty promotions and determining whether graduate students have met dissertation defense requirements, having published the “Zhejiang University Domestic First- and Second-Level Academic Journal Catalogue” in 2005 and updated it in 2016. Shanghai Jiaotong University [6] explicitly allocates bonuses for academic journal papers in its humanities and social sciences “Double First-Class” construction support measures according to the “Shanghai Jiaotong University Humanities and Social Sciences Academic Journal Grading System.” Southwest Jiaotong University passed its “Southwest Jiaotong University Academic Journal Grading Catalogue” through its Academic Committee in 2014, which classifies journals by first-level disciplines; this catalogue was updated in 2017 and currently serves as the primary basis for faculty professional title evaluation, performance assessment, and paper awards. In summary, many Chinese universities employ school-level journal grading catalogues to evaluate applicants’ journal publications during professional title reviews, dissertation defense qualification reviews, paper awards, and performance assessments. However, the inherent complexity and innovative nature of interdisciplinary research outputs render such journal grading catalogues ill-suited for their evaluation. Consequently, developing scientific evaluation methods for interdisciplinary research achievements poses a challenge to established academic journal grading standards and the definition of interdisciplinarity.

Using Professor X from Southwest Jiaotong University’s School of Mechanical Engineering as a case study, this paper employs the “Southwest Jiaotong University Academic Journal Grading Catalogue” to analyze the scholar’s SCI-indexed academic papers. By examining both the journal grading catalogue and the disciplinary orientation of the papers, the study investigates the distribution of the scholar’s publications across different schools and disciplines from a bibliometric perspective, revealing the contradictions between traditional journal grading catalogues and the evaluation of interdisciplinary research outputs. The paper subsequently proposes recommendations from the perspective of library disciplinary services to inform evidence-based decision-making.

2. Interdisciplinary Concepts and Research Progress

Numerous terms relate to the concept of interdisciplinary research, including “学科交叉” (interdisciplinary research), “交叉学科” (interdisciplinary discipline), “交叉科学” (interdisciplinary science), and “跨学科” (cross-disciplinary). The term “interdisciplinary” first appeared in the meeting minutes of the U.S. Social Science Research Council, and Columbia University psychologist R. S. Woodworth publicly proposed in 1926 that interdisciplinary research involves activities that

break through the boundaries of a known discipline and engage two or more disciplines [7]. The U.S. National Academy of Sciences' report *Facilitating Interdisciplinary Research* defines interdisciplinary research as a mode of inquiry by individuals or teams that integrates information, data, techniques, tools, perspectives, concepts, or theories from two or more disciplines or specialized knowledge areas to address problems that exceed the scope of a single discipline or field of research [8]. Regarding the relationship among interdisciplinary research, interdisciplinary disciplines, and interdisciplinary science, Academician Lu Yongxiang noted that interdisciplinary research represents the interaction among numerous disciplines, the theoretical systems formed through such interactions constitute interdisciplinary disciplines, and multiple interdisciplinary disciplines collectively form interdisciplinary science [9]. Interdisciplinary research constitutes part of interdisciplinary science's research content, guided by interdisciplinary scientific theories and methods, and through certain practices, addresses interdisciplinary problems or facilitates the formation of new interdisciplinary disciplines; some interdisciplinary activities gradually develop and grow into established interdisciplinary disciplines [10].

Domestic and international literature reveals that most scholars' discussions and interpretations of “交叉学科” and “跨学科” both correspond to the English term “interdisciplinary.” In China, some scholars initially translated it as “跨学科” when research began in the 1980s. However, at the 1985 inaugural Interdisciplinary Science Symposium, Qian Xuesen, Qian Sanqiang, and Qian Weichang used “交叉学科” in their keynote reports, after which most scholars adopted this translation. Thus, “跨学科” and “交叉学科” are essentially identical, differing only in usage across eras and among scholars.

Traditional bibliometric methods cannot effectively evaluate interdisciplinary research outputs. Issues such as the intensity and breadth of integration or intersection among disciplines and the evaluation of academic influence of interdisciplinary achievements have increasingly attracted attention from funding agencies and researchers. Interdisciplinary measurement in scientometrics uses specific numerical values to represent the strength of interdisciplinarity, enabling more accurate descriptions of richer knowledge sources and differentiation. This approach can break existing evaluation models based on the quality of journals in which research is published. Current international and domestic interdisciplinary measurement research primarily proceeds along four directions: individual academic background, collaborators, target documents themselves, and reference literature.

Analyzing scholars' disciplinary backgrounds and research fields [11] and examining collaborators' institutions and disciplines [12-13] require measurement based on individuals, making data collection cumbersome and complex, with accuracy difficult to guarantee and subjectivity inevitable. Target document content directly reflects the degree of interdisciplinarity in papers. Content-based diversity measurement primarily employs text mining and other technologies to analyze thematic distributions in literature [14] and combines multi-dimensional

indicators from target documents, references, and citing documents to measure interdisciplinarity [15-16]. However, target document measurement indicators and sources are relatively singular, whereas reference diversity can effectively measure cross-disciplinary integration. Consequently, research on interdisciplinary measurement based on references is most abundant. Measurement indicators have evolved from one-dimensional to three-dimensional comprehensive indicators. One-dimensional indicators [17-18] primarily measure the number of disciplines involved in research objects. Two-dimensional indicators measure both the number of disciplines and the evenness of their distribution, with main indicators including Shannon information entropy [19], Simpson index [20], and Brillouin index [21-22]. Three-dimensional indicators consider richness, balance, and disparity among disciplines [23-25].

3. Research Methods and Data Sources

Southwest Jiaotong University faces challenges in recognizing interdisciplinary research achievements during faculty reviews, performance assessments, and paper awards. Investigations of various schools and scholars revealed that Professor X from the School of Mechanical Engineering conducts research in tribology—a field involving surface interfaces, bionic biology, micro-nano manufacturing, and electromechanical control. Tribology is an interdisciplinary discipline encompassing multiple fields: dynamic and static friction research involves mechanical engineering; lubricating films and friction surface materials involve materials science; keratin tissue friction and joint friction involve biology; fluid-lubricated sliding bearings involve fluid mechanics; tribochemistry involves chemistry; and metal physics involves physics. This scholar has the most complex disciplinary classification and is among the top SCI paper producers in the school, making the case highly representative.

This study employs bibliometric methods using Clarivate Analytics' research performance evaluation tool InCites to analyze the disciplinary attribution of papers by Professor X from the School of Mechanical Engineering. Based on the "Southwest Jiaotong University Academic Journal Grading Catalogue" and the correspondence between schools and disciplines, Excel functions were used to analyze and organize the disciplinary and school affiliations and grading classifications of the journals in which the professor's papers were published.

First, the SCI-E database was used to obtain Professor X's "Web of Science Researcher ID" and "Alternative names." Combined with "Organization-Enhanced" limitations, the professor's academic output was retrieved. The data obtained through this search was cleaned, organized, and verified by Professor X before analysis.

4. Data Analysis

4.1 Analysis of the Scholar's Papers by Disciplinary Orientation

The search in SCIE retrieved 145 papers published by Professor X between 1999 and 2020 (see Figure 1 [Figure 1: see original paper]). Analysis of these papers' disciplinary orientations within InCites' SCADC system revealed that Professor X's 145 papers were distributed across 12 disciplines in the SCADC classification. The most frequent was materials science and engineering journals with 81 papers (55.86%), followed by mechanical engineering journals with 59 papers (40.69%). Additionally, physics journals accounted for 37 papers (25.51%), and chemistry journals for 25 papers (17.24%). If talent evaluation only recognizes research achievements in mechanical engineering, 85 papers would remain unevaluated.

4.2 Correspondence Analysis Between the Scholar's Papers and School Disciplines

Using the "Southwest Jiaotong University Academic Journal Grading Catalogue," analysis of Professor X's 145 papers published between 1999 and 2020 revealed that only 132 papers were included in the journal grading catalogue. As shown in Table 1, Professor X's papers involved 18 disciplines in the journal grading catalogue, demonstrating broad disciplinary coverage. Consistent with InCites analysis, the most frequent discipline was materials science and engineering with 91 papers, followed by mechanics with 68 papers—a significant discrepancy from InCites, which identified only 3 papers in mechanics. Notably, the field of vehicle utilization engineering, absent in InCites, accounted for 50 papers. Additionally, electronic science and engineering contributed 35 papers, while InCites showed zero publications in this discipline.

According to Southwest Jiaotong University's "Correspondence Between Graded Journal Catalogue and Schools," further analysis of paper affiliations by school (see Table 1) showed that Professor X's papers most frequently corresponded to the School of Materials Science and Engineering (91 papers), followed by the School of Mechanics and Engineering (68 papers), and the School of Life Science and Engineering (56 papers). Only 49 papers could be attributed to the professor's own School of Mechanical Engineering. This means that even when attributed to the most frequent school (Materials Science and Engineering), only 91 papers could be recognized. Moreover, only 49 papers could be directly evaluated by the professor's home school according to the journal grading catalogue.

4.3 Problems and Discussion

The above results clearly demonstrate that among Professor X's 145 SCIE papers, only 49 can be attributed to his home school, leaving 96 papers unrecognizable according to the journal grading catalogue's correspondence principles.

The school cannot directly evaluate and recognize these papers, creating uncertainty in workload calculation, paper award recognition, and professional title evaluation, which must be submitted to the university's academic committee for determination. This indicates that compared to the development of interdisciplinary research, the disciplinary classification system used for school-level evaluation lags behind. Interviews revealed that school leaders and faculty members recognize the mismatch between their school's academic journal grading catalogue and interdisciplinary research directions, but this remains a subjective perception lacking accurate and sufficient data support. Interdisciplinary researchers face significant constraints and uncertainty regarding whether their future achievements can be properly evaluated. The interviews also revealed that interdisciplinary scholars lack scientific and effective evaluation mechanisms and dedicated academic forums to facilitate domestic and international exchange and interaction of interdisciplinary research achievements, thereby hindering the dissemination of such work to some extent.

In November 2020, the National Natural Science Foundation of China established the Interdisciplinary Science Department, breaking down traditional disciplinary barriers and taking a new step toward promoting the integration of basic and applied disciplines. Interdisciplinary research lacks a relatively independent community of interdisciplinary scholars [26], making it more difficult for researchers to succeed in project applications, paper publications, and award applications [27]. These problems arise primarily because interdisciplinary researchers involve rich fields and multiple disciplines, making it difficult to find domain-matched experts for evaluation. Traditional peer review requires selecting experts from established disciplines who, while highly accomplished in their own fields, may not be familiar with interdisciplinary achievements. Consequently, they often evaluate projects or achievements only within their own disciplinary context, resulting in low ratings or inability to make reasonable judgments [28]. Current interdisciplinary evaluation methods and related empirical research focus primarily on journals, and evaluating scientific entities based on journal quality possesses certain practical rationality [29]. How to resolve the contradiction between interdisciplinary research achievements and their scholars' evaluation versus academic journal grading catalogues involves various aspects including disciplinary construction, disciplinary systems, and disciplinary assessment mechanisms. This paper proposes countermeasures solely from the perspective of library disciplinary services, based on bibliometric theories.

5. Countermeasures and Recommendations

5.1 Adopt More Sophisticated Evaluation Methods for Interdisciplinary Journals

Current university evaluations of researchers' workload, award applications, and professional title reviews primarily rely on the quality of journals in which their research is published. However, as an objective bibliometric evaluation method, journal grading catalogues exhibit certain inadaptability for evaluating inter-

disciplinary research achievements. As interdisciplinary evaluation becomes increasingly urgent, many scholars have focused on evaluating interdisciplinary journals. Compared to single-discipline journals, interdisciplinary journals exhibit significant citation differences due to their varied disciplinary fields, making it impossible to simply assign them to a specific discipline for evaluation. Therefore, evaluation methods must be refined according to the special characteristics of interdisciplinary research.

Interdisciplinary journal evaluation has not yet formed a mature indicator and methodological system [30]. Main evaluation indicators include integration (I) and specialization (S) indices [15], impact factor percentiles [31], PR8 index [32], Z-index [33], PRP index [34], and P-index [35]. Through normalization, these indicators can avoid disciplinary differences to some extent and enable evaluation of interdisciplinary journals. However, interdisciplinary journal evaluation indicators should not be limited to the modification and improvement of traditional metrics; they must also incorporate the unique characteristics of interdisciplinary journals through continuous comparative analysis and optimization to promote the continuous improvement of interdisciplinary research evaluation and achieve fairer, more accurate assessment of scholars with relevant achievements.

5.2 Establish Multi-Dimensional and Flexible Evaluation Approaches

Interdisciplinary research exhibits diverse characteristics in organizational forms and quality outputs. Research achievements include not only traditional journal papers but also new technologies, products, designs, and patents. Evaluation methods should be flexibly adjusted according to the characteristics of different achievement types. Interdisciplinary research has longer cycles and more complex theories than single-discipline research, with long-term effects and outcomes that cannot be produced in short timeframes. Therefore, faculty interdisciplinary research achievements should be evaluated over relatively longer periods. Additionally, socially problem-oriented interdisciplinary research achievements should consider not only their academic value but also their application value, meaning evaluations should recognize both academic accomplishments and contributions to solving practical problems [36]. American universities employ multiple evaluation methods during interdisciplinary scholar performance reviews, fully considering various complex issues faculty may encounter [37]. Evaluation flexibility should also manifest in assessing research, teaching capabilities, and social service from multiple dimensions. When establishing evaluation standards, the uncertainty inherent in interdisciplinary research should be considered, including possible changes during research, ensuring scholars receive fair and reasonable evaluations that enable better dedication to scientific research.

5.3 Conduct Collaborative Multidisciplinary Evaluations

Interdisciplinary research involves multiple disciplines, each with unique research methods, disciplinary languages, value systems, and disciplinary cultures. The diversity of disciplinary values and cultures necessitates that evaluations of interdisciplinary researchers integrate and coordinate differences among disciplines, forming a balance that recognizes different disciplinary values and cultures from a multidisciplinary perspective. Some foreign institutions allow applicants to provide expert lists in relevant research fields as references for review [39]. K. Shimada et al. [40] proposed that applicants could better improve their plans by listening to experts from different disciplines through seminars during the review process. By integrating value characteristics from different disciplines, a new value system can be formed that retains or strengthens overlapping disciplinary value orientations while complementing different ones, thereby encompassing the value orientations of all disciplines involved in interdisciplinary research [41]. Only through such a value system can evaluations fully recognize interdisciplinary scholars' achievements in journals and conferences outside their primary discipline or in interdisciplinary journals, as well as other relevant research outputs, balancing knowledge integration across disciplines and facilitating fairer evaluation of scholars with different interdisciplinary achievements.

5.4 Establish Dedicated Interdisciplinary Evaluation Panels

Investigations of relevant schools and scholars revealed that due to considerations of disciplinary assessment, schools exhibit certain self-protection tendencies, hoping researchers publish in journals corresponding to their schools' responsible disciplines to achieve better evaluation results, making it difficult to attribute interdisciplinary achievements to other relevant disciplines. Interdisciplinary scholars' research achievements involve multiple disciplinary collaborations and different application fields, inevitably involving multiple stakeholders including schools, various colleges, multiple disciplines, or other institutions. The author found during investigations that many universities have established specialized interdisciplinary evaluation panels to coordinate stakeholder interests and guide relevant evaluation work [42]. Academic research achievements that cannot be evaluated within individual colleges are submitted to these panels, whose members collaborate with various schools to propose evaluation methods. Therefore, evaluation panels should have authority higher than individual colleges, with members comprising not only the scholar's home college and colleges of involved disciplines but also relevant university evaluation department personnel, who gather opinions from various schools to continuously improve evaluation mechanisms. These panels enhance the orderliness and efficiency of interdisciplinary achievement evaluation, maximizing objective and fair evaluation of scholars' research achievements and the scholars themselves, thereby solving evaluation problems that single entities like colleges cannot resolve.

6. Conclusion

Compared to evaluating scholars with single-discipline research achievements, evaluating scholars with interdisciplinary research achievements involves more complex disciplinary backgrounds, multiple evaluation subjects, and higher demands for evaluation transparency, making such evaluations more uncertain and complex. Correctly understanding the contradictions between interdisciplinary research achievements and academic journal grading catalogues, recognizing the value of interdisciplinary research achievements, adopting more diverse data, expanding the types of research objects, and employing a combination of peer review and bibliometric evaluation to establish a reasonable and comprehensive evaluation system for interdisciplinary research achievements will enable objective and fair evaluation of interdisciplinary researchers and better encourage them to pursue interdisciplinary research.

References

- [1] Zhang Tiecheng. Overview and Characteristic Construction of Contemporary Music Education[J]. Journal of the Chinese Society of Education, 2015(S2): 83-84.
- [2] Ministry of Education, Ministry of Finance, National Development and Reform Commission. Notice on Issuing the “Guiding Opinions on Accelerating the Construction of ‘Double First-Class’ in Higher Education Institutions”[EB/OL].[2021-02-21]. http://www.moe.gov.cn/srcsite/A22/moe_{843}/201808/t20180823_{345987}.h
- [3] Guan Cuizhong, Fan Aihong, Zeng Xiaomu. Contradictions and Countermeasures Between School Setup and Interdisciplinary Research in Disciplinary Assessment: Taking Tsinghua University’s Civil Engineering Discipline as an Example[J]. Journal of Academic Libraries, 2019, 37(6): 85-88.
- [4] Notice on the 2020 Professional Technical Position Evaluation Arrangement of the School of Foreign Languages[EB/OL].[2021-02-21]. <http://flc.scu.edu.cn/info/1052/7889.htm>.
- [5] Domestic Academic Journal Catalogue 2016 Edition[EB/OL].[2021-02-21]. <http://grs.zju.edu.cn/attachments/2019-04/07-1555639480-180406.pdf>.
- [6] Notice of Shanghai Jiao Tong University on Issuing the Supporting Cultivation and Incentive Measures for the “Double First-Class” Construction in Humanities and Social Sciences[EB/OL].[2021-02-21]. <http://www.sugli.sjtu.edu.cn/upload/file/20181217/20181217154752>.
- [7] Liu Zhonglin. Interdisciplinary Research in the Era of Interdisciplinary Science[J]. Studies in Science of Science, 1993, 4(2): 11-18, 4.
- [8] National Academy of Sciences. Facilitating Interdisciplinary Research[R]. Washington, DC: The National Academies Press, 2004.

- [9] Lu Yongxiang. The Significance of Interdisciplinary Research and Interdisciplinary Science[J]. Bulletin of Chinese Academy of Sciences, 2005(1): 58-60.
- [10] Zhang Xue, Zhang Zhiqiang. A Systematic Review of Interdisciplinary Research[J]. Library and Information Service, 2020, 64(14): 112-125.
- [11] Liu Zhonglin, Zhao Xiaochun. Interdisciplinary Research: The Driving Force of Scientific Original Achievements—Taking Centennial Nobel Prize in Physiology or Medicine as an Example[J]. Science, Technology and Dialectics, 2005(6): 107-111.
- [12] Zhang Lin, Sun Beibei, Huang Ying. Research on Interdisciplinarity Under Cross-disciplinary Collaboration Models—Taking Highly Cited Scholars in ESI Social Sciences as an Example[J]. Journal of the China Society for Scientific and Technical Information, 2018, 37(3): 231-242.
- [13] Karlovcec M, Mladenec D. Interdisciplinarity of Scientific Fields and Its Evolution Based on Graph of Project Collaboration and Co-authoring[J]. Scientometrics, 2015, 102(1): 433-354.
- [14] Wei Jianxiang, Sun Yuehong, Su Xinning. Research on Interdisciplinary Knowledge Mining Models[J]. Information Studies: Theory & Application, 2012, 35(4): 76-80.
- [15] Potter A L, Cohen A S, Roessner D J. Measuring Researcher Interdisciplinarity[J]. Scientometrics, 2007, 72(1): 117-147.
- [16] Huang Ying, Gao Tianshu, Wang Zhinan, et al. Research on Interdisciplinarity Based on Web of Science Categories[J]. Science Research Management, 2016, 37(3): 124-132.
- [17] Porter A L, Chubin D E. An Indicator of Cross-disciplinary Research[J]. Scientometrics, 1985, 8(3/4): 161-176.
- [18] Zhang L, Rousseau R, Glanzel W. Diversity of References as an Indicator of the Interdisciplinarity of Journals: Taking Similarity Between Subject Fields into Account[J]. Journal of the Association for Information Science & Technology, 2016, 67(5): 111-112.
- [19] Huang M H, Chang Y W. A Study of Interdisciplinarity in Information Science: Using Direct Citation and Co-authorship Analysis[J]. Journal of Information Science, 2011, 37(4): 369-378.
- [20] Simpson E H. Measurement of Diversity[J]. Nature, 1949, 163(4148): 688.
- [21] Brillouin L, Hellwarth R W. Science and Information Theory[J]. Physics Today, 1956, 9(12): 39-40.
- [22] Cheng Xinyue, Liu Yiyun, Ye Ying. Analysis of Interdisciplinarity of Hot Papers in Physics and Chemistry[J]. Library and Information, 2020(3): 55-60.

- [23] Stirling A. A General Framework for Analysing Diversity in Science, Technology and Society[J]. *Journal of the Royal Society Interface*, 2007, 4(15): 707-719.
- [24] Chen Saijun, Chen Zhigao. Φ Index for Measuring Interdisciplinarity in Disciplinary Fields—Taking China’s Science of Science Research Field as an Example[J]. *Science of Science and Management of S. & T.*, 2014, 35(5): 3-12.
- [25] Potter A L, Rafols I. Is Science Becoming More Interdisciplinary? Measuring and Mapping Six Research Fields Over Time[J]. *Scientometrics*, 2009, 81(3): 719-745.
- [26] Zhang Chengzhi, Wu Xiaolan. Review of Interdisciplinary Research[J]. *Journal of the China Society for Scientific and Technical Information*, 2017, 36(5): 523-535.
- [27] Bromham L, Dinnage R, Hua X. Interdisciplinary Research Has Consistently Lower Funding Success[J]. *Nature*, 2016, 534(7609): 684-487.
- [28] Mansilla V B. Assessing Expert Interdisciplinary Work at the Frontier: An Empirical Exploration[J]. *Narnia*, 2006, 15(1): 17-29.
- [29] Zhang Xuemei. Research Progress on Interdisciplinary Academic Evaluation Methods from the Perspective of Scientometrics[J]. *Information Studies: Theory & Application*, 2020, 43(7): 171-178.
- [30] Zhang Huiling, Dong Kun, Xu Haiyun. Research Progress on Academic Journal Influence Evaluation Methods[J]. *Library and Information Service*, 2018, 62(16): 132-143.
- [31] Yu Liping. Research on the Characteristics of the “Impact Factor Percentile” Indicator[J]. *Library and Information Service*, 2016, 60(10): 103-107.
- [32] Liu Xueli, Wei Yahui, Sheng Lina, et al. Journal PR8 Index: A New Interdisciplinary Journal Evaluation Indicator and Its Empirical Study[J]. *Library and Information Service*, 2017, 61(11): 116-123.
- [33] Chen Weijing, Zhang Yu’e. Improved Z-index for Interdisciplinary Journal Evaluation[J/OL]. *Library Tribune*: 1-8[2021-02-22]. <http://kns.cnki.net/kcms/detail/44.1306.G2.20201228.09>
- [34] Zhang Xuemei, Li Hua. Research on PRP Index and Its Improvement for Interdisciplinary Field Journal Evaluation[J]. *Information Studies: Theory & Application*, 2016, 39(2): 50-53.
- [35] Chen Weijing, Zhang Yu’e, Lin Meifang. Research on P-index for Journal Evaluation from the Perspective of Citation Distribution[J]. *Library and Information Service*, 2017, 61(17): 122-130.
- [36] Liu Fanfeng, Yu Shishi, Luo Fen. Principles and Indicator Construction for Interdisciplinary Research Evaluation[J]. *China Higher Education*, 2013(5): 42-44.

- [37] Geng Yiqun. Principles, Approaches and Characteristics of Faculty Performance Evaluation for Interdisciplinary Research in American Research Universities[J]. Modern Education Management, 2017(4): 41-45.
- [38] Qian Jun. Research on Funding Models and Evaluation of NSFC Interdisciplinary Projects[D]. Beijing: Beijing Institute of Technology, 2016.
- [39] Wei Wei, Liu Zhonglin. New Progress in Foreign Interdisciplinary Evaluation Theory[J]. Science of Science and Management of S. & T., 2011, 32(4): 20-25.
- [40] Shimada K, Akagi M, Kazamaki T, et al. Designing a Proposal Review Process to Facilitate Interdisciplinary Research[J]. Research Evaluation, 2007, 16(1): 13-21.
- [41] Wei Wei. Evaluation Methods and Funding Strategies for “Interdisciplinary Research”[D]. Hefei: University of Science and Technology of China, 2011.
- [42] Liu Fanfeng, Yu Shishi, Luo Fen. Principles and Indicator Construction for Interdisciplinary Research Evaluation[J]. China Higher Education, 2013(5): 42-44.

Note: Figure translations are in progress. See original paper for figures.

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