

## The Influence of Non-quantitative Evaluation Index on Postgraduates' Scientific Research Integrity

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**Abstract.** To explore whether the incorporation of more non-quantitative indicators into the evaluation system can help postgraduates improve their scientific research integrity. Methods The managers or doctoral supervisors with more than 10 years'experience in graduate education management were invited by mail. According to the requirements of the State Education Commission and the relevant regulations and professional training objectives of the Graduate Work Manual of our university, non-quantitative indicators for evaluating the research ability of graduate students were drawn up with the content of the mid-term assessment as the basic framework. Teachers and students were randomly selected to explain the non-quantitative evaluation indicators, and their opinions and attitudes towards the indicators were collected. After data checking and collating, EPIDATA 3.1 is used for input and SPSS 20.0 is used for data processing. Results A total of 20 experts participated in the formulation of evaluation indicators, including three first-level indicators and 11 second-level indicators, each of which was divided into four grades: failing, passing, good and excellent. A total of 135 postgraduate students were surveyed and 130 questionnaires were retrieved, with a recovery rate of 96.3%; 28 teachers were surveyed and 28 questionnaires were retrieved, with a recovery rate of 100.0%. Among them, 43 postgraduates (33.1%) thought the quantitative index was very useful, 31 (23.8%) thought it was more useful, 22 (16.9%) thought it was general, 19 (14.6%) thought it was completely ineffective, 15 (11.5%) thought it was counterproductive, 10 (35.7%) teachers thought it was very useful, 13 (46.4%) thought it was more useful, and 3 (10.7%) thought it was effective. Generally, one (3.6%) thought it was totally ineffective and one (3.6%) thought it was counterproductive; there was a significant difference in its constituent ratio. Conclusion Non-quantitative indicators have the potential to improve the integrity of Postgraduates in scientific research, so we can try to establish a practical assessment system.

Scientific research integrity refers to professional credit in the field of science and technology, which is a special part of the social credit system. The Center for Academic Integrity (CAI) in USA defines scientific integrity as "adhering to the five fundamental values of honesty, trust, justice, respect and responsibility even in adversity"[1]. The Chinese official definition of scientific research integrity is: "scientific research integrity, also known as scientific integrity or academic integrity, refers to the scientific research workers to seek truth from facts, not to cheat, not to falsificate, but also to abide by the criteria of scientific value, scientific spirit and scientific activities of the code of conduct" [2-3]. In modern society, science and technology has become the primary productive force that determines the development of social economy. In order to ensure the rapid and healthy development of science and technology, it is essential to create a healthy scientific research environment. Scientific research integrity is an important condition for creating a benign research environment in the scientific community and ensuring the credibility of science. [4]. However, in recent years, various reports of academic fraud have emerged in endlessly, violating the traditional value of scientific research, causing a crisis of scientific research integrity and shaking people's confidence in the results of scientific research. There are various reasons for the crisis of scientific

research integrity, including the increasingly serious trend of commercialization of scientific research, the low salary of scientific researchers, and the low scientific and humanistic literacy, among them, the unreasonable formulation of evaluation indexes for scientific research achievements has been criticized for a long time. At present, the evaluation index of scientific research achievements in our country is over a single. Simple quantitative assessment makes researchers only take results as guidance in scientific research activities, which not only loses the motivation to think deeply and explore in the road of scientific research to carry out the latest and hottest projects that can produce results quickly, but also abets the evils of academic misconduct in scientific research. When the results are not ideal enough, it is necessary to carry out scientific research projects. Arbitrary tampering with data, no time for scientific research, directly inviting people to write on behalf of others and so on are everywhere. In this case, many unhealthy phenomena such as arbitrary tampering with data when the results are not ideal, direct invitation to write for others when there is no time for scientific research are increasingly visible [5].

Graduate students are the main force of scientific research in our country and the main component of future scientific researchers, whose scientific thinking will play a decisive role in the development of future science. If from the postgraduate stage, they are infected with the bad habits of academic misconduct and lose their awe of scientific research, it will be not optimistic for the future development of science[6-7]. Therefore, it is imperative to strengthen the education of postgraduate scientific research integrity and improve the situation of postgraduate scientific research integrity. This article, starting from the evaluation index system, instead of adopting a one-size-fits-all and results-based evaluation system, it was tried to incorporate more non-quantitative indicators to make a more comprehensive and rational evaluation of the comprehensive quality of postgraduates. It is of great significance to improve the level of scientific research integrity of graduate students and the integrity atmosphere of scientific research.

## **Materials and Methods**

### **Indicators Selection.**

The indexes were collected related to the comprehensive evaluation method of postgraduate evaluation as the first-hand reference materials. Managers or doctoral supervisors with more than 10 years' experiences in graduate education management were invited through e-mail, and some of them participated the communication conference refer to the study. According to the requirements of the State Education Commission and the relevant provisions of the Graduate Student Work Manual and professional training objectives of our university, the non-quantitative indicators for evaluating the scientific research ability of graduate students were drawn up with the content of the mid-term assessment as the basic framework[8].

### **Questionnaire Investigation.**

Graduate students of different colleges were sampled in 5:1 ratio by stratified random sampling with school numbers. Teachers in our school were randomly sampled according to their work numbers. The proposed non-quantitative indicators of postgraduate scientific research ability are used as subjects to explain to the respondents and collect their opinions and attitudes towards the indicators.

### **Statistical Analysis.**

EPIDATA 3.1 was adopted for data entry after data checking and sorting. SPSS 20.0 was used for data processing. The counting variables were described in the form of frequency (percentage). Pearson chi-square test was used to analyze the difference between the two groups, with  $\alpha=0.05$ .

## **Results**

### **Non-quantitative Indicators Supplement.**

A total of 20 experts participated in the formulation of evaluation indicators, including 3 first-level indicators: ideological and moral, academic performance, scientific research ability; 11 second-level indicators: scientific attitude, stress resistance, basic theory, professional knowledge, literature

retrieval ability, literature reading ability, experimental skills, scientific research record writing, problem-finding ability, problem-solving ability, and communication ability; Each index is divided into four grades: failing, passing, good and excellent.

Table 1 Non-quantitative indicators supplement

first-level indicators	second-level indicators	assessment element
ideological and moral	scientific attitude	Open-minded, curious, good at critical thinking and respecting objective facts
	stress resistance	Facing all kinds of difficulties not to be discouraged, with indomitable strong quality
academic performance	basic theory	Solid basic theory, wide coverage, non-biased discipline
	professional knowledge	More in-depth understanding of research directions
scientific research ability	literature retrieval ability	Familiar with commonly used Chinese and foreign database and retrieval methods, can accurately retrieve the target literature according to the purpose, no repetition, no omission.
	literature reading ability	Ability to read and understand complex, high-quality literature independently and share the information with others
	experimental skills	Independently engaged in scientific research, good grasp of information processing of medical advanced technology, equipment and methods, comprehensive analysis and solving of practical medical problems
	scientific research record writing	Research records record format specification, rigorous, focused
	problem-finding ability	Open-minded, bold and innovative, close-minded, good at finding loopholes and putting forward new ideas
	problem-solving ability	Good at thinking from different perspectives, integrating resources from all sides, and seeking the best solution to the problem
	communication ability	Be good at expressing one's own views accurately and listening and understanding others'

### Questionnaire Investigation.

135 postgraduates were surveyed totally and 130 questionnaires were collected, with a recovery rate of 96.3%; 28 teachers were surveyed and 28 questionnaires were collected, with a recovery rate of 100.0%. Thereinto, 43 postgraduates (33.1%) thought the quantitative index was very useful, 31 (23.8%) thought it was more useful, 22 (16.9%) thought the effect was general, 19 (14.6%) thought it was completely ineffective, and 15 (11.5%) thought it was counterproductive. Ten teachers (35.7%) thought that the quantitative index was very useful, 13 (46.4%) thought it was more useful, three (10.7%) thought it was generally effective, one (3.6%) thought it was totally ineffective, and one (3.6%) thought it was counterproductive. There was significant difference in its composition ratio, as shown in Figure 1

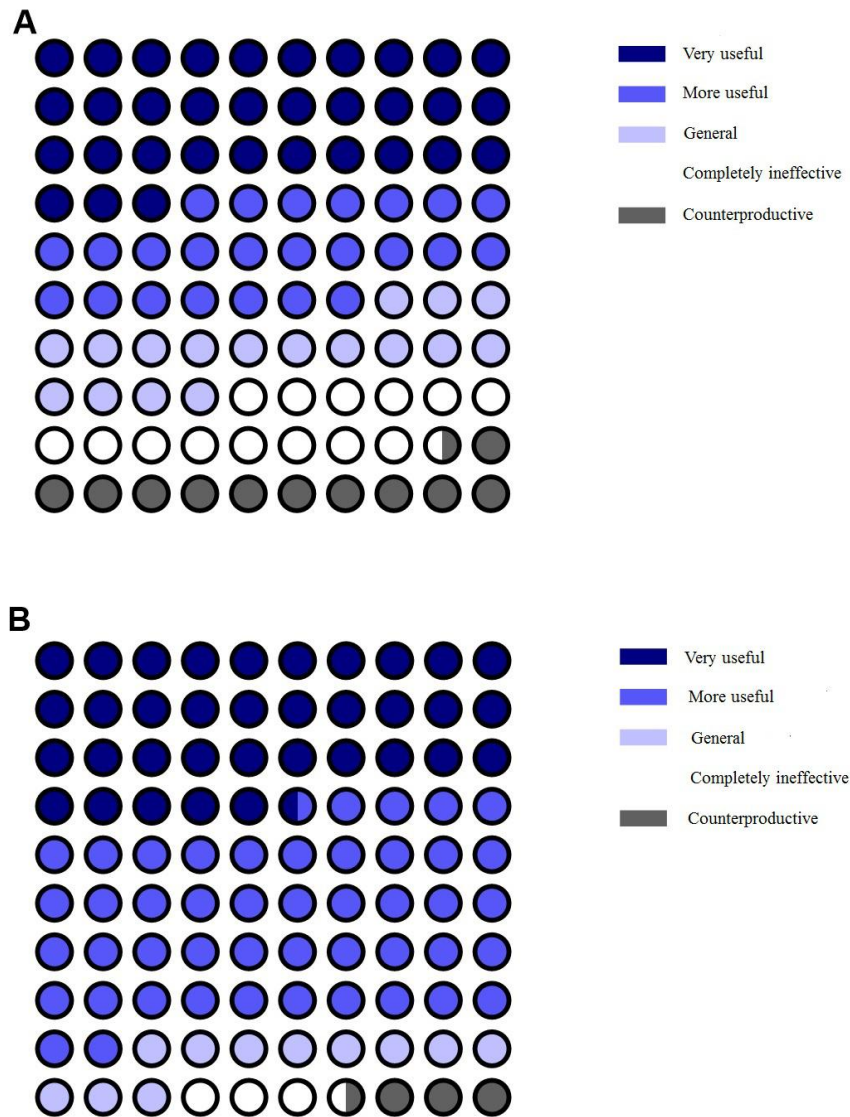


Figure. 1 Questionnaire results. A) Postgraduates group; B) Teachers group.

## Discussions

The significance of the evaluating indicator is to judge the performance of people and things by unifying the criteria that are fairly accepted by the whole industry. Universities and research institutes can judge whether graduate students meet the graduation requirements by comparing the evaluation indexes horizontally and vertically, so as to decide whether to award relevant degrees or not. They can further award scholarships or free examinations to outstanding students, and punish students who do not perform well by postponing their graduation. Therefore, the evaluation index has a strong guiding role. One of the important factors leading to bad scientific research integrity currently and the frequent occurrence of academic misconduct is due to adopting too simple quantitative indicators to evaluate the value of scientific research personnel, which equates scientific research activities with piece-work, and links scientific research projects, papers published, achievements produced, the quantity and quality of scientific and technological awards with the post setting, title evaluation and salary distribution of staff members, resulting researchers are anxious to achieve quick success and get instant benefits, blindly pursue the number of papers and even resorting to improper means of falsification. There are similar problems in graduate student groups, such as all kinds of awards and excellent evaluation only based on papers, one-sided evaluation indexes lacking of scientificity, which is not conducive to the comprehensive cultivation of graduate

students [10-11]。 This study synthesizes experts'and all sides opinions, and puts forward a set of non-quantitative evaluation indicators, which comprehensively evaluates postgraduates from three first-level indicators, namely, ideological and moral, academic achievement and scientific research ability, and 11 second-level indicators, such as scientific attitude, basic theory and literature retrieval ability, in order to guide the balanced development of Postgraduates in all aspects, instead of being result-oriented, earnestly researching and paying attention to honesty. Making Real Contributions to Academic Development.

There are some difficulties in the implementation of non-quantitative indicators. Different evaluators may have different judgments on the same object, and subsequent management is more difficult. However, non-quantitative indicators pay attention to the vertical comparison of postgraduate's own quality, pay attention to multi-perspective and all-round evaluation, change from the past to the present and future quality evaluation, and conform to the development direction of modern postgraduate education. [12]。 Many people are more optimistic about the results. A total of 10 teachers (35.7%) think that the quantitative index is very useful, 13 (46.4%) think it is more useful. Among graduate students, 56.9% think that the non-quantitative index is very useful and useful to improve the ability of graduate students to abide by scientific research integrity (see Figure 1). Therefore, it can be concluded that the formulation of non-quantitative indicators will provide valuable experience for the future improvement of graduate students' scientific literacy and scientific research integrity, and the follow-up results can be expected.

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