

# Standardizing the Basic Medicine Postgraduate Research Management Evaluation System to Promote the Cultivation of Excellent Research Talents

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**Abstract:** Postgraduate medical education is the highest level of medical education. The training quality of postgraduate medical education is not only the lifeline for the survival and development of medical schools, but also inextricably linked to people's lives. Given the unique characteristics of medical education, the expanding scale of postgraduate medical education, and the increasingly diversified types of training, without any effective monitoring of the training process for medical postgraduates, both the quality of education and the development of the society will be affected. Master's education in basic medicine is a crucial part of postgraduate medical education, but its training objectives are completely different from those of students with a master's degree in clinic. Postgraduate education in basic medicine pays more attention to the mastery of knowledge and the cultivation of scientific and practical ability, showing greater foresight and individuality in its cultivation process. This paper discusses the postgraduate training mode in Wenzhou Medical University and creates an assessment system focusing on "literature reading ability," "open literature transcription," "distinctive academic report," "multidisciplinary cross-opening," "mid-term assessment with a blind review by an additional expert," and "laboratory operation technique assessment." Different assessments and evaluations are conducted at different stages to train postgraduates in mastering various experimental techniques and methods, while developing the ability to think independently, solve problems, and design research projects.

**Keywords:** Basic medicine; Postgraduate research management; Talent cultivation; Evaluation system

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## 1. Introduction

"The Opinions of the Ministry of Education, National Development and Reform Commission, and Ministry of Finance on Deepening the Reform of Postgraduate Education" has pointed out that postgraduate education is the primary way to cultivate high-level talents and an important part of the national innovation system <sup>[1]</sup>. Since the reform and opening-up, postgraduate education in China has made significant achievements and realized the strategic goal of cultivating high-level talents. However, on the whole, postgraduate education cannot fully adapt to the diversified needs of economic and social development, and a considerable gap still exists between the training quality and the international advanced level <sup>[2]</sup>. Improving the quality of education is the eternal motif of university development and construction.

Master's education in basic medicine is an important part of postgraduate medical education, but its training objectives are completely different from those of students with master's degree in clinic [3]. The academic master's degree in basic medicine education pays more attention to the mastery of knowledge and the cultivation of scientific research practice ability, showing greater foresight and individuality in its cultivation process. Therefore, as an essential criterion to judge the quality of an academic master's degree in basic medicine, the cultivation of scientific research ability is emphasized instead of course grades [4]. Although universities have developed various rules and regulations in postgraduate training, these rules and regulations, in general, are implemented by administrative leadership bodies. Although some universities have established a postgraduate teaching supervision system, they lack a specific evaluation system and fail to form a supervision and guarantee system for the whole postgraduate training process [5]. In addition, the existing postgraduate supervision system primarily focuses on administrative management and lacks guidance. The ultimate goal of postgraduate medical education, as a high-level academic master's degree in basic medicine, is to cultivate students' independent innovation ability. It is difficult to achieve the purpose of promoting the improvement of education quality through simple management without timely guidance [6]. Therefore, in order to promote the improvement of quality of master's degree training in basic medicine, it is necessary to establish a set of independent, perfect, objective, and operative supervision and guarantee systems as a key link for basic medicine postgraduate education, namely the writing of dissertation following the law of postgraduate education in basic medicine.

## **2. Review of postgraduate education methods**

At present, postgraduate education has become one of the vital factors influencing comprehensive national power, and countries around the world are paying more attention to postgraduate education. After decades of development, postgraduate education in China has made great achievements. However, but there are certain problems, among which the quality of postgraduate education has always been the concern of the academic community. The training of postgraduate students in each country has different characteristics, which are mainly manifested in three aspects: diversified training objectives, diversified training levels, and diversified training methods.

In terms of training methods, there are mainly professional training models represented by the United States (US). These professional training models are characterized by a standardized training process, diversified types of training, a flexible academic system, outstanding curriculum characteristics, "guidance groups" joint training, cooperation with industrial and commercial enterprises to form a collaborative training model, and a standardized organizational management [7]. Joint supervision by supervisory groups is employed to reduce the one-sidedness of supervisors' "one opinion" on the identification of graduate students and to emphasize the contention of a hundred schools of thought so as to strengthen the collision of scientific research ideas among members of each group [7]. The US has a strict "elimination system" for postgraduates. The elimination rate can reach up to 10%–15% for postgraduates, and 30%–40% for prestigious universities, with emphasis on usual examinations, such as postgraduates' research reports and performance in seminars [8]. The United Kingdom (UK) postgraduate education is characterized by a lenient entry but a strict exit, focusing on process assessment. The mentor-apprentice training method, which is typical of German graduate education, originated in the Middle Ages and was a model for all countries to follow, influencing the establishment of graduate training models around the world [9]. This type of education is centered on the "mentorship" system, which emphasizes the primacy of scientific research in the training process, with little formal classroom teaching and more emphasis on discussions and practical training. The teaching-style training model, on the other hand, is commonly applied to the training of Japanese graduate students [10]. This training model is characterized by the autonomy of the admission examination, strict control of the quality of admission of graduate students, curriculum focusing on the

combination of basic theory and educational objectives, a teaching method that is discussion-driven for students' self-learning, improvement of research ability through participation in practical projects, and process management of graduate students in the form of research labs. Additionally, graduate students are encouraged to participate in academic conferences, the quality of graduate students is monitored through a strict evaluation system, and the organization and management are integrated with industry, government, and academia<sup>[11]</sup>. In short, each country has its own unique postgraduate training model, but commonalities do exist, one of which is the focus on group discussion and the strict training process assessment.

Compared with the quality evaluation of postgraduate education in developed countries, that in China started late. In February 1985, the Academic Degrees Committee of the State Council decided to establish an inspection and evaluation system for the quality of degree conferment at all levels, thus officially launching the work of constructing a quality evaluation system for postgraduate education in China. So far, the research on the supervision system for graduate students in China has focused more on management, mostly on "compensatory supervision" and "management supervision," and solely emphasizing on the supervisory duties of supervisors. There is a lack of research on how to conduct guidance and an even greater dearth of research on developmental supervision that places more emphasis on goal orientation, behavior regulation, creativity of change, continuity of development, and result motivation. At the same time, some existing postgraduate supervision systems focus solely on the supervision of training results, neglecting the supervision of the training process. Moreover, supervision and inspection are carried out only for certain aspects in the graduate education process (*e.g.*, completion of credits, publication of the thesis, *etc.*). This "result-based" supervision lacks supervision of the whole process, thus making it possible for academic misconducts, such as academic forgery and plagiarism. Other than that, there is a lack of systematic research on an independent and objective education quality monitoring system that conforms to the laws of postgraduate education and targets the whole process of postgraduate training.

### **3. Training model for basic medicine graduate students in Wenzhou Medical University**

In this paper, by learning from the postgraduate training methods of developed countries and taking into consideration of the actual situation in China, an assessment system for the cultivation of scientific research abilities, such as "literature transcription," "experimental techniques," "academic report," and "opening and mid-term assessment," is established. This teaching method is based on the international mainstream training method of "discussion for learning." By formulating a systematic system for scientific research ability assessment and standardizing the educational monitoring system and assessment for the entire postgraduate training process, this teaching method strengthens the quality control of the training process, grasping both the training process and the training results to promote the cultivation of top scientific research talents.

#### **3.1. "Literature reading ability" assessment and "open literature transcription" requirement**

Different requirements are set for graduate students at each level, depending on their ability to read literature. Postgraduates are required to complete a detailed review of 10 English-written documents in the first semester and 20 English-written documents in the second, third, fourth, and fifth semesters, respectively. Each document shall be accompanied by a reading report. At the end of each semester, the literature text and reading reports will be compiled, bound, and submitted to the Graduate Management Department. The department will assign experts and supervisors to evaluate the submitted reports and allocate grades as follows: A+, A, B+, B, C, and D. One of these documents will be designated as a copybook for the following semester and presented in an open format within the discipline. A "D" for literature transcription would require the student to re-read the literature and write another reading report. The purpose of establishing "open literature reading" is to change the previous loose pattern of "literature reading" within the

supervisor's group, which requires the discipline to report the time and place of literature reading to the graduate administration before the reading. Students and faculty who are interested are welcome to participate and listen to the supervision. "Open literature transcription" allows one to learn the research ideas, methods, and results of others, discuss the rigor of the paper and the problems that need to be solved, as well as exercise their expression and comprehension skills. The ability to express oneself is reflected in the ability to speak and write, which requires time to develop. Through literature transcription, graduate students can explain and report the contents of their reading and the enlightenment they have gained, train their ability to express themselves, summarize, and analyze problems, as well as gain a better understanding of the progress of related research, all of which would benefit them.

### **3.2. Grading of "distinctive academic report"**

Questionnaires are distributed to graduate students; research is conducted from literature review, reading and organization, experimental methods, operation experience exchange, to thesis writing; and topics that interest graduate students are compiled as the report content. It is necessary to listen to the opinions of graduate students and experts and select a keynote speaker for the academic report based on the advantages and direction of the discipline's development. Major experts and scholars are selected to discuss literature reading and organization, while senior graduate students are selected to conduct the experience exchange and share their practical experiences. The academic report will be written, along with a post-listening report, in which postgraduates are required to summarize what they have heard and record down their feelings after listening in the form of a written report, which will be submitted and evaluated by experts and instructors and graded as follows: A+, A, B+, B, C, and D. It will be archived and used as a reference for future academic presentation activities. The cultivation of innovative ability in postgraduates cannot be achieved without a strong academic environment. A "distinctive academic report" enables postgraduates to communicate and learn from experts physically, expand their vision and knowledge, enrich their background knowledge and understanding of basic theories, broaden their scientific research ideas, and nurture their own research interests.

### **3.3. Review and control of "multidisciplinary cross-opening"**

The opening report seminar for postgraduates requires five or more supervisors, including two experts and supervisors from related disciplines. Various aspects, from the three-dimensional basis and the technical feasibility to the purpose and significance of topic selection, are discussed to provide constructive advice and a guarantee for the seminar. The opening report must be explained in PowerPoint form. The opening report should include the title, purpose, and significance of the selected topic, the current status of local and foreign research, the content of the research, the experimental materials and methods, the technical route, the innovation points, the proposed results and conclusions, the main references, *etc.* The title of which should include treatment factors, subjects, and experimental effects; the wording should be scientific, standardized, and not more than 20 words. The purpose and significance of the selected topic, *i.e.*, to provide an answer to the question of why the research is needed, are discussed in terms of the practical need (the practical significance of the research derived from the existing problems), and then the theoretical and academic values, requiring specificity and objectivity, while avoiding empty and meaningless slogans. The current state of local and international research, *i.e.*, literature review, is predicated on a review of literature that should be relevant but not unduly limited to the research question. The so-called "synthesis" of a review is a synthesis of research in a certain subject area over a certain period; "description" is not so much a narrative as a review or commentary, *i.e.*, it should have the author's unique insights. It is necessary to discard bias, and it is a clear mistake not to cite ideas that are contrary to the supervisor's views and one's own opinion. The object of the overview can be materials and methods in addition to ideas.

### **3.4. Mid-term assessment with a blind review by an additional expert**

The mid-term assessment for postgraduates requires five or more postgraduate supervisors, four of whom are prepared by the discipline itself, and an additional expert who is required by the training unit for the mid-term evaluation of the discipline within the scope of all supervisors. Postgraduates are required to present their scientific research progress in PowerPoint form, report their experiment progress to both the experts and the students, and answer the questions raised by the experts and students. The assessment phase requires careful examination and review of the original experimental records to ensure integrity education. At present, academic misconducts do happen, mostly as a result of the haste to success. The core concern here is the issue of integrity. The issue of academic style, on the other hand, should be seriously addressed to ensure the rigor and accuracy of scientific research, increase scientific research awareness, standardize the scientific research style, and create a good academic style as well as a good research environment for Hainan Medical College. The writing of a comprehensive dissertation is an important component of postgraduate training and a test of candidates' research ability and level in the education process. It reflects postgraduates' comprehensive knowledge system, professional knowledge, innovation ability, and research level. A mid-term assessment report, a copy of the original experimental records, a literature review (publication is not required), and a plan for the next step of work are all required after the presentation.

### **3.5. “Five basic experimental techniques” to meet the standard assessment**

It has been stipulated that graduate students in basic medicine should master at least five basic experimental techniques and pass the graduate management examination. The five basic experimental techniques are based on specific professional disciplines. For example, graduate students in basic medicine and biology must master cell culture techniques, hematoxylin and eosin (HE) staining techniques, immunohistochemistry techniques, polymerase chain reaction (PCR) techniques, and western blot techniques. This examination adopts a flexible system, in which graduate students can apply to sit for the experimental technique examination in any semester within three years, but they must pass all the examinations before graduation in order to be qualified for the thesis defense. Each assessment is undertaken by different disciplines, and each project requires two examiners. The student is deemed qualified only when both examiners agree to pass the student.

## **4. Conclusion**

Basic medicine is a discipline that focuses on research and practice, and its training for postgraduates focuses on the cultivation of postgraduates' research operation ability, innovation ability, induction and summarization ability, as well as expression and communication ability. The assessment of “literature reading ability,” “open literature transcription,” “distinctive academic report,” “multidisciplinary cross-opening,” “one additional blind expert,” “experimental operation technique assessment,” and other research ability assessment systems can help explore the development of high-quality innovative talents in line with the current situation of graduate education in China. The cultivation of innovation and practical abilities in postgraduates improves their innovation quality and perfect their innovation ability, which will lead to more innovative achievements, responds to the needs of the knowledge economy era, and promotes the harmonious development and progress of China's socialist cause.

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## Disclosure statement

The authors declare no conflict of interest.

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