

An Analysis of Factors Affecting the Scientific Research Barriers of Young Doctoral Teachers in Universities

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Abstract: Young doctoral teachers are the main force for universities to enhance their academic influence and level. Scientific research is the key for young doctoral teachers to highlight their own academic value. However, they will inevitably encounter various barriers in their scientific research. Based on the in-depth interviews with 11 young doctoral teachers, this paper summarizes and analyzes two kinds of factors that negatively affect the research work: organization and adaptation. Combined with the human development ecosystem theory, the research findings are further excavated and analyzed, and it is pointed out that the scientific research barrier of young doctoral teachers after entering colleges and universities is not the problem of personal adaptation to the new work environment in the usual sense, but the problem of how to smoothly integrate of the two ecological systems, and integration is the process of the comprehensive and complex changes.

Keywords: Young doctoral teachers; Barriers to scientific research; Influencing factors; Ecosystem theory

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According to the latest statistics from the Ministry of Education, the number of domestic doctoral graduates in 2020 has reached 66,176, and the cumulative total of doctoral graduates has exceeded 800,000, of which 43.9% of the doctoral graduates chose to enter universities for teaching and scientific research. Young doctorates are the main force for higher education schools to improve their school-running level, enhance their academic competitiveness and influence, and play a key role in promoting the overall development of education. For young doctoral teachers, scientific research is the key to highlight their own value, but it is bound to be interfered by many adverse factors in the research work. In this study, 11 young doctoral teachers from 6 universities in China were selected to investigate the influencing factors of scientific research barriers and interpret them with the combination of ecosystem theory and its derivative model. It is expected to refine and analyze these barriers through empirical investigation and promote the academic ability and career development of young doctoral teachers.

1. Research background

1.1 Literature review

In this study, the barriers in scientific research especially refer to the barriers encountered by young doctoral teachers in universities and colleges in scientific research, which make their scientific research work unable to be carried out smoothly, the research process difficult, and the research results difficult to obtain. Researchers at home and abroad focus on the factors influencing the output of scientific research achievements of university teachers. C. Bland et al. proposed a model affecting the output of scientific research workers, which includes individual factors (age, gender, motivation, knowledge background, skills, etc.), management factors and institutional factors (resources, assessment, reward, working hours, promotion standards, etc.)^[1]. O.Aydin summarized 24 external factors (structural characteristics of colleges and universities and the opportunities they provide for research) and 27 internal factors (population variables and individual attributes)^[2]. Through literature review at home and abroad and multiple linear regression analysis, Li Lu found that the main factors affecting the scientific research output of college teachers are individual characteristics, organizational atmosphere and the working conditions of university teachers^[3]. Yan Guohua et al. believe that the basic scientific research exchange mechanism, collaborative work performance measurement and utilitarian internal benefit gambling will cause insufficient scientific research cooperation among college teachers, thereby reducing the output of scientific research results^[4].

Although the existing research results are abundant, the research method is relatively single, and the quantitative survey almost

dominates this research topic. Although the quantitative method can identify various influencing factors, it cannot explain the mechanism of these factors in depth.

1.2 Theoretical basis

American anthropologist and ecological psychologist U. Bronfenbrenner put forward the influential ecological system theory of human development in his book "The Ecology of Human Development". This theory advocates that the individual will actively interact and interact with the surrounding environment during the development process, so the individual does not exist in isolation. Human development ecosystem mainly includes micro-system, which is the environment that closely contacts with individuals and has direct influence on individual development; ecosystem, which is the environment that individuals do not participate in but have indirect influence on individuals; macro-system, which is the broad social environment and ideological background in which individuals grow. There are intricate connections and interactions between different systems, and individuals are developed in such connections and interactions^[4].

Based on the biological ecosystem theory of human development, the student days of young doctoral teachers can be regarded as a multi-level original ecosystem with individuals as the core. Entering a university to work can be regarded as the process of integrating into the new ecosystem, which is accompanied by the disintegration and reconstruction of subsystems at various levels in the original system, prompting the transformation of various concepts and norms that young doctors are accustomed to in the original ecosystem. There may be two results: one is to stick to the original ecosystem; the other is to integrate into the new ecosystem.

2. Research design

2.1 Data Collection

This study mainly adopts two methods of online interview and face-to-face interview, and conducts one-to-one in-depth interview with the research participants for data collection. In this study, young doctoral teachers refer to those under the age of 35 who have obtained doctoral degree and are engaged in the teaching and scientific research in domestic universities. Through a combination of random sampling and snowball sampling, 11 young doctoral teachers were selected from 6 domestic colleges and universities (their entry time is within 5 years; the gender is equal to half; 9 have intermediate titles, 2 have associate senior titles; 6 are married, 4 have had children, the interview number is A1-A11), and in-depth interviews were conducted for 1-2 hours on the core topic of the influencing factors of scientific research barriers.

2.2 Data Analysis

In order to ensure the objectivity and integrity of the interview data analysis and the theme extraction, this study adopts the thematic analysis method. The analysis process is as follows: First, get familiar with the sorted interview data, and encode the part related to the research question; Secondly, the interview materials with similar meanings are classified into sub-themes to ensure the boundaries between each theme. Thirdly, the sub-theme is further refined; finally, the finalized theme is named accurately according to the main characteristics^[5].

3. Factors affecting the barriers of scientific research of young doctoral teachers in colleges and universities

3.1 Organizational factors: a weak sense of belonging to the team, contrasted with student days

According to J. Katzenbach, a team is a small group of people with complementary skills who are willing to take responsibility for each other for a common purpose and approach. Under the leadership of the academic leaders, the scientific research team of the university is carried out by a team of scientific research workers with complementary professional titles, majors and educational backgrounds to carry out scientific research activities around the research topic. Through the interviews, it was found that young doctoral teachers who have just joined the work expressed an urgent need to belong to the scientific research team, eager to find a suitable team in the new working environment and become a member of it. Just as A3 said: "Although I am independent in form after graduation, I still rely on my mentor in terms of scientific research direction, and I need an academic guide or a team to adapt to the new environment for my transformation from student to teacher." Generally speaking, the team plays an active role in the scientific research development of young doctoral teachers. A1 said that "during my doctoral study, there are eight members in my research group. Usually, I don't need to collect data by myself. The research group will make an overall plan and add the research I want to do, and someone will be responsible for collecting data, so I don't need to collect data by myself." A6 also believes that "there must be a team for scientific research, and team support should be comprehensive, including discussion and resource sharing." When A9 was a student, her tutor held monthly seminars for students, "At the meeting, everyone would share their research progress and difficulties. The teacher will help them improve some content, and everyone can get some targeted help." A9 believes that "everyone can learn something and gain some fresh ideas through the group meeting." However, the reality is that after leaving their student days and entering universities, some young doctoral teachers cannot find their own team, which not only causes teachers' loneliness from emotional experience, but also leads to the phenomenon of "fighting alone", "fighting for themselves" and "self-employed" in scientific research work. For the young doctors who can join the research team, we find that their research collaboration has a shallow dilemma. A7 said, "At present, the research collaboration between me and my colleagues in the teaching and Research Office is limited to the joint application of the project. Due to the differences in research directions, more symbolic and substantive cooperation behaviors such as joint research and collaborative research on the same issue in their respective fields need to be enhanced." Shallow-level scientific research collaboration cannot well achieve mutual trust among researchers, and it would restrict the potential of young doctoral teachers in the fields of knowledge sharing and inspiration. On the one hand, shallow-level scientific research collaboration is very unfavorable for solving complex, systematic and comprehensive scientific problems. On the other hand, it is not easy to make any breakthroughs on some prominent, thorny and difficult issues.

3.2 Adaptation factors: lack of awareness of the job title requirements, and difficult to change the direction of research

Due to the nature of teaching and research work of college teachers and the requirements of professional title evaluation, young doctoral teachers must publish various Chinese teaching reform papers. Due to the nature of teaching and research work of college teachers and the requirements of professional title evaluation, young doctoral teachers must publish various Chinese teaching reform papers. Some young teachers of science, engineering and medicine devote most of their energy to writing English papers and strive to publish more SCI journal articles, and rarely write Chinese articles. A2 said: "When I first joined the job, the director of the teaching and research office arranged for me to undertake the teaching work of the organic chemistry course for freshmen, and to write a related teaching reform article. Since I am work on a science major, I have no teaching practice experience. I am unfamiliar with teaching work, lack of academic vocabulary for education majors, and am not proficient in the logic and paradigm of teaching reform paper writing, so I cannot write Chinese teaching reform papers." The professional title evaluation system requires not only the publication of educational reform papers, but also the application of provincial and national scientific research projects. A1 recounted his own experience: "During my studies, I always wrote papers under the project of my supervisor. At the beginning of my work, I didn't pay attention to project application at all. Later, I gradually realized that the difficulty of applying for a project is sometimes more difficult than publishing a paper. Papers can be written at any time, and there are many alternative journals. However, many project application may only happen once a year, and if you miss it, you have to wait for the next year. If you don't take the opportunity to take it seriously and fill in the application form carefully, it will be impossible to apply for the project, there will be no scientific research funding support, or even no bargaining chip for professional title promotion. In the application of scientific research project, A9 also said, "During the study period, we all did research under the project of our supervisor, and never applied for our own project. After graduation, we have to write the project application by ourselves, which is a little difficult to start." Whether it is a bureau-level project or a national-level project, there are requirements for applicability and practicality, that is, the application of scientific research projects needs to be based on social development and national needs. A11 said: "I found that writing a project application requires a national concept and a personal research direction should be in accordance with the current needs of national development. Since the National Natural Science Foundation of China gives me the financial support, the research direction I choose and the results produced need to be useful to the country. In the past, my research direction was more to choose what I was interested in from my supervisor's project and carry out relevant research, rather than focusing on important issues in national development. For the research direction I am not specialized in, even if the project is approved, it will be painful to do, and it will be difficult to produce good articles." In addition, young doctoral teachers working in university research institutes inevitably have to carry out scientific research in accordance with the existing research direction of the institute. A8 said: "During my master's and doctoral studies, the research direction was the research of platelet production and apoptosis. Around this direction, 4 SCI papers have been published whose first author was myself. Due to personal and family reasons, I joined the Institute of Rheumatology and Immunity in my current university. The team in the institute carries out the research direction of internal rheumatoid arthritis and studies the pathogenesis of RA. Although my original direction has a certain correlation with the current research, the research direction is quite different, and currently I cannot integrate into the team well. " Not understanding the requirements of the professional title evaluation system in colleges and universities and the difficulty of changing research directions after entry will obviously make young doctoral teachers fall into the confusion of scientific research work, and the scientific research productivity will be worrying.

4. Discussion and conclusion

Based on the theory of human development ecosystem, this study discusses the factors that hinder the research work and effectiveness of young doctoral teachers in universities and colleges, and divides the factors into two categories: organization and adaptation. The young doctoral teachers involved in this study, due to their long-term student life, have gradually formed a set of ecosystems with their individuals as the core. The most obvious manifestation of the micro-system is the relationship and interaction between the doctoral students in their student days and their supervisors and members of the research group; young doctoral teachers generally report that the problem of weak sense of team belonging explains the negative effect of the external system to a certain extent. In addition, the influence of the requirements of the professional title evaluation system in colleges and universities will penetrate and be reflected in various subsystems, and exert influence on the scientific research work of young doctoral teachers, which belongs to a typical macro system. The biological ecosystem theory of human development provides a logical and systematic framework for analysis. Therefore, we recognize that the personal development of young doctoral teachers is the result of the integrated effects of microsystem, medium system and macro system. However, it should be pointed out that this theory does not unilaterally focus on the impact of the environment on individuals, but emphasizes the interaction between individuals and their environment.

Doctors have formed a set of ecosystem (the original ecosystem) with individuals as the core in their student days, while they have to face the ecosystem (the new ecosystem) of universities and colleges after graduation. The dialogue and integration of two different systems have become an unavoidable fact. Secondly, from the perspective of individual teachers, the process of integration is a comprehensive and complex transition from micro-system and external system to macro-system, and each level of system needs to be adjusted according to the actual situation of the new ecosystem. The process itself is very complicated. Young teachers should strive to play an active role, highlight the value of the subject, uphold a positive and open attitude, take the initiative to communicate, and strive to integrate into and interact with the new environment, rather than passively emphasize how the adverse external environment hinders the scientific research work.

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