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Practice and Reflections of Undergraduate Mentorship System in Cultivating Innovative Ability of Applied Talents

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Abstract: Undergraduate mentorship system is a novel talent-training mode that has emerged recently, which has been implemented in many domestic universities and achieved good results, but also revealed a lot of problems. Combined with personal practical experience, this paper probes into the implementation path of undergraduate mentorship system in the cultivation of applied talents' innovative ability, analyzes the problems such as the imperfect system, the high ratio of students to teachers, the uneven level of students and the different levels of tutors, and puts forward some corresponding countermeasures and suggestions, in order to provide a useful reference for the optimization and promotion of the system.

Keywords: Mentorship system; Undergraduates; Applied talents; Innovation ability.

1. Introduction

The mentorship system has been commonly implemented in China's postgraduate education, but the undergraduate mentorship system is still in the developing stage [1]. In 2004, the Ministry of Education advocated that universities with the conditions should actively implement the undergraduate mentorship system, arranging at least one mentor for each newly enrolled undergraduate student to provide targeted guidance to help them complete their studies and improve their overall quality more efficiently [2]. However, due to the great variation among different universities and the influence of geographical distribution, faculty strength, student quality and school planning, most ordinary universities in China, especially new applied undergraduate institutions, are still using the traditional system of class teachers and tutors to manage small classes in collaboration. Some universities have introduced and implemented the mentorship system for undergraduates, but due to the lack of experience and the unreasonable nature of the system, it is virtually useless, and students only have their own mentors in name, but they are not guided by them in a targeted manner [3, 4], which also defeats the original purpose of the mentorship system for undergraduates.

Applied undergraduate institutions are committed to cultivating the applied talents needed for the development of society in the new era, which plays a very crucial role in the cultivation of students' innovative abilities [5]. The implementation of the mentorship system provides a new way out of the traditional "pot-luck" mode of undergraduate training, and its proper implementation will greatly promote the achievement of the goal of training innovative talents. The School of Materials and Environmental Engineering of Chengdu Technological University, a new applied undergraduate institution, has been fully implementing the mentorship system for undergraduate students since 2018, and has achieved good results. Therefore, this paper will discuss the realization path of the undergraduate mentorship system in the cultivation of innovative talents with practical experience, analyze the main problems existing in the implementation of the system at this stage, and put forward corresponding countermeasures and suggestions, aiming to contribute to the better cultivation of innovative talents.

2. Path to the Realization of Undergraduate Mentorship

2.1. Inspiring Students to Think and Supervising Independent Learning

Unlike the class tutor system, the mentorship system enables students to be more directly informed of their personal characteristics and learning situation through closer and more frequent contact between tutors and students, and facilitates tutors to discover the difficulties and needs of students in their studies, so as to give them targeted attention and guidance. To achieve this process, tutors need to engage in a timely dialogue with students to identify problems and, more importantly, to inspire students to think, to teach them that when they encounter problems, they should not just follow the ideas of others or their tutors, but should have their own ideas, be good at thinking and daring to express them, propose solutions and actively argue them. After developing the habit of active thinking, students will have a better understanding of the meaning of university study, which in turn will urge them to develop good habits of independent learning and lay a good foundation for subsequent improvement of their overall creative abilities.

2.2. Encouraging Students to Participate and Activating Research Thinking

Once students have settled into their undergraduate life and learning style and have some basic knowledge of the subject, tutors should encourage students to participate in research activities as appropriate. As a higher level of learning and innovation, research activities require students not only to apply what they have learnt flexibly, but also to learn and master more than what is taught in the classroom, to incorporate their own ideas creatively and to learn scientific argumentation.

The focus of the tutor's task at this stage is to take the students through the door of research, and to develop a programme of research training of increasing difficulty, in

which the students gradually master how to use library resources for literature research, how to use laboratory resources for experiment design and demonstration, how to use data processing software for data analysis, and how to write papers, patents and project applications. The participation in these activities not only paves the foundation for the completion of students' graduation thesis, but also activates their scientific thinking, expands their academic horizons and builds up their strength for the subsequent enhancement of their innovative abilities.

2.3. Guiding Students to Dual Innovation and Igniting Innovation Vitality

Dual-innovation activities, i.e. innovation and entrepreneurship activities, are an important way and carrier to enhance the efficiency of cultivating the innovation ability of applied talents in China's universities [6]. Mentors should play a "guiding" role when students are engaged in innovation and entrepreneurship activities, which includes two levels: the first level is "direction", when students are confused about the initial stage of dual-innovation, mentors should play the role of "leader", answering the questions of students who are new to dual-innovation activities and encouraging them to actively participate in them; the second level is "instruction", when students enter the substantive stage of dual-innovation activities, mentors should play the role of "indicator", giving guidance and support to the details of the activities to ensure its smooth implementation.

At present, there are various types of dual-innovation activities, including various national, provincial and university-level student innovation and entrepreneurship training programmes, as well as dual-innovation competitions such as the Internet Plus, Challenge Cup, Energy Conservation and Emission Reduction, and Life Science Competition, etc. Tutors should advise students to choose according to their actual situation, with the aim of igniting innovation, rather than blindly delaying their studies [7, 8].

3. Problems of the Mentorship System for Undergraduates

3.1. Immature Mentorship System and Huge Resistance to Moving Forward

As the mentorship system for undergraduate students is still in its initial stage in China, there are large gaps between different schools and between different second-level colleges or majors in the same school, so there is still great resistance to the full promotion of the mentorship system.

Most universities, second-level colleges or majors that have already implemented the mentorship system for undergraduates have formulated relevant systems or norms, but the content is usually simplistic, with no concrete arguments or clear explanations on many detailed issues. Common problems include: (1) unclear core responsibilities and tasks of the mentorship system; (2) unclear ways of assessing and evaluating the effectiveness of implementation; (3) lack of timely and effective feedback mechanisms for students' evaluation opinions; and (4) unscientific methods of accounting for mentors' workload. All these problems have become bottlenecks that hinder the promotion of the mentorship system for undergraduates.

3.2. Significantly High Student-teacher Ratios and Intense Tutor Workload

The current student-teacher ratio in undergraduate colleges and universities stipulated by the Ministry of Education cannot exceed 18:1, and in theory the student-teacher ratio of the undergraduate tutorial system should be close to it [9]. However, in the actual implementation process, the student-teacher ratio often seriously exceeds the standard for the following reasons: (1) not all teachers serve as student mentors, especially teachers who also serve as administrative posts usually do not undertake the task of mentorship; (2) not all teachers who serve as mentors undertake the same number of students' guidance work, and because some teachers' academic qualifications and titles do not meet the requirements, they can only guide two to three students in each term. The excess will be taken up by teachers whose academic qualifications and titles meet the requirements.

In the case of Chengdu Technological University, for example, it is stipulated that the number of students to be supervised by each tutor will not exceed 10 students per session, and any excess will be met by employing part-time tutors from outside the university. The result is that some tutors are supervising a total of 40 students, which is equivalent to a large class, and the work is very intensive and difficult; while the external tutor system reduces the student-teacher ratio, but the effect of guidance on students is also very limited.

3.3. The Uneven Standard of Students Makes Mentoring Difficult

As students come from all over the country, the basic quality and learning ability of students differ greatly from each other, so it is often difficult for tutors to provide one-to-one guidance, and the result is that only some students can accept the guidance of tutors, while those who do not take the initiative themselves will be "released". After the implementation of the tutor system for undergraduate students, many universities have abolished the original class teacher system in order to maximise the use of resources, and the concept of "class" has become increasingly blurred. Students who have been "let loose" are at high risk of losing motivation and even developing psychological problems because they cannot find organisation. In addition, some universities adopt a random allocation system when assigning students, so that students are assigned at the beginning of their studies when they do not know each other, which may result in some tutors being assigned to students who are generally of poor standard. Due to the lack of good role model power within such a group, students do not want to learn, tutors cannot bring them up, and some students have difficulties in even graduating properly, not to mention the development and enhancement of their creative abilities.

3.4. Different Levels of Mentors and Large Gaps in Mentoring Effectiveness

The undergraduate mentorship system is a new mechanism for student-teacher interaction, and the level of teachers has a greater impact on the effectiveness of mentoring. Firstly, the level of teaching, mentoring experience and academic background of mentors varies, and so does the degree of guidance received by students. Secondly, some mentors, for various reasons, provide little or no guidance to the students they supervise, and have neither research activities nor

support for dual-innovation activities, while some mentors are very attentive and provide guidance to students throughout their studies, prompting some students to grow rapidly under the mentoring system and improve their innovation skills significantly, while some students stagnate or even regress. In addition, there are cases where some students have high demands that cannot be met by their mentors, and students lose opportunities because they do not have enough support from their mentors. There are also some students with average foundation who have been assigned mentors who are very attentive and have risen to the top with the strong support and powerful guidance from their mentors, and the gap between students has gradually widened, and it is not uncommon for students to compare themselves with each other and complain about their tutors.

4. Solutions and Suggestions

4.1. Improving System Construction and Clarifying Mentors' Rights and Responsibilities

A perfect system is the guarantee of its efficient operation. Schools or majors implementing the undergraduate mentorship system should formulate a system or specification suitable for the development of the school or the major, taking into account the actual situation. The system needs to be well thought out, with the core responsibilities and tasks of tutors clearly defined, scientific assessment and evaluation methods constructed, timely and effective feedback channels for students' opinions provided, and the workload accounting of the tutorial system clearly defined [10]. Only when there is evidence to follow can we avoid confusion in the implementation process.

The duties of mentors should be concentrated on matters related to the cultivation of innovation ability, such as students' study, scientific research and dual innovation, instead of taking over the life, employment and other chores that class teachers or counsellors are originally responsible for, and becoming the one who carries the weight. Due to the inadequacy of the system, some university departments require tutors to complete a large number of student chores that are not part of their work, in addition to their heavy teaching load, which is undoubtedly a way to squeeze teachers through the tutorial system. For undergraduate institutions without a master's degree, the role of senior students in "passing on" to junior students is usually very limited, and tutors often need to work personally and sacrifice a lot of time to train students. A mentorship system without clear authority and responsibility will only become a burden for the mentors. In addition to improving the system, the second-level colleges should provide a more harmonious working environment for the mentors so that the mentorship system can develop sustainably.

4.2. Strengthening Collaborative Management to Improve Cultivation Quality

At present, due to the limitation of the teacher base, it is difficult to provide one tutor for every three to five students in the undergraduate mentorship system in China.

But, the pressure of insufficient teachers can be alleviated by means of collaborative management [11]. Firstly, it is recommended that the class teacher system should be retained in the first and second years, with the class teacher playing a major role in the management of students in collaboration with the tutor, and the tutor playing a major role in the third and fourth years, so that the average number of students supervised by the tutor will be significantly reduced. Secondly, Secondly, it is necessary to strengthen the collaborative management of tutors. After the implementation of the tutor system, tutors should not only focus on students' evaluation of awards and merits, but also cooperate with tutors to provide students with more professional and detailed life guidance, employment guidance and psychological counselling. Thirdly, we should strengthen the coordination and management between tutors. Teachers with similar teaching or research directions can form subject groups and include students in them for joint guidance, which can enable students to be guided by two or even more tutors at the same time. A rational division of labour between tutors will in turn facilitate a more scientific and efficient supervision process, thereby improving the quality of student training.

4.3. Promoting Two-way Selection and Protecting the Rights of Teachers and Students

Two-way selection is a common model in the job market and in the field of postgraduate training at present, and it is not a bad reference to apply it to the mentorship system for undergraduates. After entering the university, students should first understand the purpose and role of the mentorship system, and then get to know the basic information of their mentors through online and offline meetings held by the college. The mentors can also assess the students' knowledge or ability in various forms, and then determine the target of mentoring after two-way selection, avoiding the situation of uneven standards of students due to random assignment.

Students should communicate with their supervisors in a timely manner after they have chosen their supervisors, and should not "follow the crowd". They are allowed to apply for a change of supervisor within a specified period of time, but the college should give priority attention to and examine students who frequently apply for a change of supervisor. After a student has been selected by a supervisor, he or she should develop a personalised training programme for the student, and should not adopt a one-size-fits-all approach. Applications for change of supervisors for students are allowed under prescribed conditions, and the college should reduce the number of students supervised by a supervisor who is generally poorly evaluated by students or provide a second supervisor for students to maximise the protection of the rights of both teachers and students.

4.4. Enhancing Mentor Training to Improve the Level of Mentoring

Letting educators be educated first is an important way to improve the level of teaching and education of educators. For schools or majors that implement the undergraduate tutorial system, strengthening the training of tutors is an important way to guarantee their level of guidance.

Firstly, there is a need to strengthen the training of tutors' management knowledge. Some teachers are not incapable of guiding students, but they are not good at managing them, resulting in ineffective guidance. Secondly, there is a need to strengthen the professional knowledge training of mentors. Some teachers are unable to drive students to innovation because their knowledge systems are relatively old. In the new era of rapid knowledge updating, teachers should have a strong sense of progress, constantly learning cutting-edge

knowledge and updating their knowledge base in order to keep up with the times and transfer the latest ideas to students. In addition, there is a need to strengthen the role of exemplary mentors among mentors, who can be invited to share their experiences with mentors who are more effective in mentoring, and to improve their own mentoring by learning from each other's strengths and complementing each other's weaknesses.

5. Summary

The implementation of the mentorship system for undergraduates has injected new impetus into the cultivation of the innovative ability of applied talents, which is one of the important tasks in the development of higher education in China. The implementation of the mentorship system has given a new impetus to the cultivation of innovative ability of applied talents. The path of its realization includes urging students to study independently by inspiring them to think, activating their scientific thinking by encouraging them to participate in scientific research activities, and igniting their innovative vitality by guiding them to participate in dual-innovation activities. In view of the many problems that still exist in the current undergraduate mentorship system, it is suggested that countermeasures such as improving institutional construction, strengthening collaborative management, advocating two-way selection and strengthening mentor training should be taken to solve them, so that the role of the undergraduate mentorship system in the cultivation of the innovative ability of applied talents can be more fully exploited and the progress and sustainable development of the system in the field of higher education can be promoted.

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