

# The Existing Issues and Development Strategies of Higher Education's Role in Supporting Science Popularization Education in Remote Areas

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**Abstract:** Higher education institutions are an important field of popular science education, which can greatly contribute to the development of primary and secondary education in remote areas, and colleges and universities should give full play to their advantages to vigorously develop popular science education. As an important force in the national scientific and technological innovation system, colleges and universities are the main position of scientific and technological achievements, with rich human resources and scientific and technological resources, and are excellent "boosters" for the popularization of science. However, there are still some problems in the relevant science popularization in colleges and universities, such as insufficient science popularization funds, single form of science popularization, insufficient establishment of science popularization evaluation system, and ignorance of the actual needs of the people in science popularization content. Through an in-depth analysis of the current situation of popular science education in colleges and universities, this paper proposes measures to effectively improve the current situation of popular science education in colleges and universities by increasing financial investment, carrying out diversified and innovative forms of popular science, perfecting the construction of the evaluation system of popular science and paying attention to the actual needs and professional training, etc., which are committed to promoting the high-quality development of popular science education in colleges and universities and thus helping remote local primary and secondary school science education.

**Keywords:** University Science Popularization, Development strategy, Primary and secondary schools in remote areas

## 1. Background Analysis

For primary and secondary school students in remote areas, science popularization education resources are considered a "scarce commodity." Although China's education system has been largely perfected, even impoverished students in remote areas now have access to schools and books. However, this alone is not sufficient, as the educational quality in these regions still lags behind urban schools, particularly in the field of science. Science popularization education not only disseminates scientific thinking and cultural knowledge but also strives to enhance the scientific literacy of the general public, breaking down knowledge barriers and fostering a more open scientific culture. The 20th National Congress of the Communist Party of China highlighted the need to "strengthen the construction of the national science popularization capability, deepen nationwide reading activities, and improve the voluntary service system and work system." Higher education institutions play a crucial role in talent cultivation, scientific research, social service, cultural inheritance and innovation, and international exchange and cooperation. With advanced teaching equipment and well-equipped laboratory facilities, universities possess unique advantages in promoting science popularization education.

## 2. Current Situation Analysis

In recent years, with the improvement and implementation of science popularization laws, the country has increasingly emphasized science popularization activities. Many universities have actively engaged in science popularization education, effectively promoting the dissemination of scientific knowledge and enhancing the scientific literacy of the general public. However, overall, there are still challenges in the science popularization activities of universities, especially concerning remote areas. Issues such as insufficient funding, a limited range of dissemination methods, and an inadequate evaluation system

persist, leaving significant room for improvement. Despite the positive momentum, there is a need for further progress in addressing these challenges, particularly in ensuring the effectiveness and inclusivity of science popularization efforts in remote regions.

### ***2.1 Insufficient Funding for Science Popularization***

The survey results show that the main sources of funding for science education services in remote areas include government grants, social donations, independent preparation by schools, and other sources of funds. With the continuous increase of the Chinese government's investment in popular science education, it has played an important role in promoting the development of popular science education. In recent years, the government has increased its investment in popular science education nationwide, but it is mainly used in the following three aspects: first, the construction of popular science venues, such as libraries, science and technology museums, etc.; second, the maintenance or replacement of popular science equipment, such as some colleges and universities have advanced laboratories or experimental bases; third, the construction of new media platforms. However, there is relatively little funding dedicated to supporting popular science education in colleges and universities, especially in remote areas.

Through the survey, we found that at present, the main source of funding for popular science education in colleges and universities is mostly a small part of the funds for teaching and research laboratories or scientific research projects. These phenomena show that under the existing resource allocation system, the current funds for popular science education in colleges and universities are more concentrated on the investment and construction of scientific research infrastructure, and lack of strong support for specific popular science activities, courses and projects, which is tantamount to a huge difficulty for colleges and universities to carry out popular science education activities in remote areas, which is equivalent to cutting off popular science activities from the source.

In addition, there are very few funds dedicated to supporting popular science education in school research projects. According to the Law of the People's Republic of China on the Popularization of Science and Technology (hereinafter referred to as the "Law on Science Popularization"), "the people's governments at all levels shall include the funds for science popularization in the financial budgets at the corresponding level, and gradually increase them along with the national economic and social development". Since there is generally no special fund for popular science education in the school scientific research project funds, many scientific research projects do not set up a special fund for "popular science education", which also leads to the lack of special fund support in the process of carrying out popular science education services in China's universities.

### ***2.2 Limited Variety in Science Popularization Formats***

At present, the common forms of science popularization activities carried out by colleges and universities in remote areas mainly include popular science lectures, popular science exhibitions, the opening of related courses, popular science competitions[1], social practice and other ways as shown in Figure 1. Most of the popular science activities are carried out in the form of lectures and exhibitions. However, these traditional forms are too old and lack pluralism, resulting in relatively poor effectiveness of popular science education activities. The problem with these monotonous and archaic popular science activities is that they focus too much on boring knowledge transfer and ignore the interactive experience with the audience. Therefore, this method is more like a one-way information indoctrination, and fails to achieve the goal of making the audience understand scientific and cultural knowledge easily and profoundly. Therefore, it is necessary to explore new methods and ways to enhance the attractiveness and interactivity of the activities when carrying out popular science activities, so as to better disseminate scientific and cultural knowledge.

In order to improve the current situation of popular science activities, universities should pay more attention to the interaction with their audiences. This can be achieved by innovating the format of the event and focusing on the feelings of the audience. Popular science activities are not only the transfer of knowledge, but also an interactive experience that arouses interest, stimulates curiosity and prompts thinking for primary and secondary school students in remote areas. Only through such interactive experiences can they better ignite their love for science and cultivate their admiration for science. Therefore, when colleges and universities carry out popular science activities, they should be innovative in their thinking to meet the needs of different audiences. This may include the use of more interactive educational tools and methods, the design of more engaging and interesting activities, and the continuous improvement and optimization of the quality of popular science activities by paying attention to the

feedback and feelings of the audience. In this way, popular science activities will be able to better interact with the audience, enhance the effect of knowledge dissemination, and stimulate the audience's interest and enthusiasm for science.

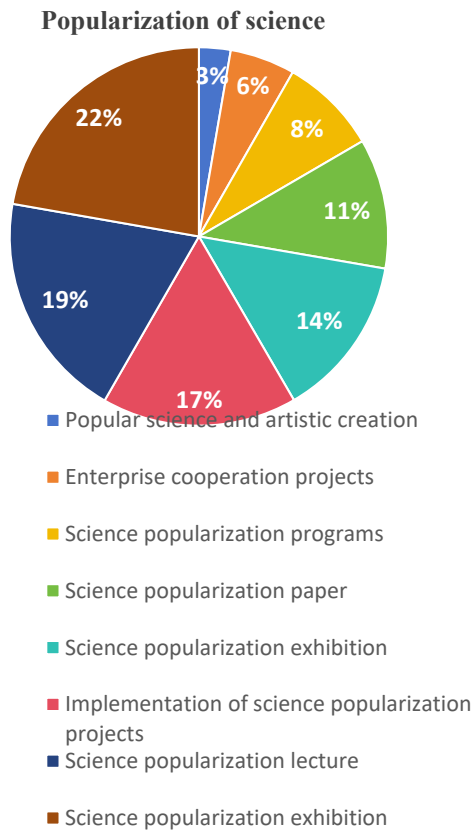


Figure 1: Distribution Chart of Science Popularization Formats

### 2.3 Insufficient Construction of Science Popularization Evaluation System

In the work of science popularization in colleges and universities, teachers, as the main participants, often contribute by publishing popular science articles and books. However, in general, the enthusiasm of university teachers in science popularization is not satisfactory. This phenomenon is mainly due to the fact that university teachers' engagement in science popularization work is neither included in the workload, nor is it regarded as a formal achievement of scientific research or teaching, so they lack sufficient motivation and enthusiasm to participate. In this context, we need to explore in depth how to motivate teachers to participate in science popularization and their potential.

In addition, the core of cultivating professional talents in colleges and universities lies in the establishment of a sound teaching system. However, as far as some colleges and universities that have set up science popularization majors are concerned, the teaching system for this major is not perfect. Unlike other majors, students majoring in popular science are also required to take a final exam at the end of the semester. However, teachers of popular science majors need to evaluate students' grade points based on their attendance and usual practice performance, because popular science majors focus on practice, and only learning theoretical knowledge will cause students to be unable to keep up with the pace of development of the times. In addition, the imperfection of the teaching evaluation system is also a prominent problem. As an emerging discipline, popular science has its own unique characteristics, and the imperfection of the teaching evaluation system will make the relevant person in charge of the Academic Affairs Office unable to gain insight into the problems existing in this major in time[2]. Therefore, it is particularly urgent to improve and perfect the teaching system and teaching evaluation system of popular science majors.

This fact shows that under the current system of popular science education in colleges and universities, the work of popular science has not received sufficient attention in the construction system of colleges

and universities. The lack of clear reward mechanisms and recognition has led to a lack of motivation among teachers to participate in science popularization work. In the current system of popular science education in colleges and universities, popular science work is not regarded as an important and necessary task, and the lack of support from relevant systems and policies makes it impossible for popular science to develop and grow as it should be. Therefore, it is necessary to conduct in-depth research on the popular science education system in colleges and universities, and take relevant measures to promote the development of popular science work.

#### ***2.4 Popular Science Content Ignores The Actual Needs of the People***

Due to the different growth environment and education level of the university organizations in remote rural areas, the content and specific implementation plan of popular science education formulated will inevitably deviate from the actual needs of the audience. However, in order to reduce the complexity of the preparation process, most organizations do not go to remote rural areas in advance to conduct field visits, and rarely use online forms such as questionnaires to collect data on popular science hot spots in the minds of the public. Therefore, blindly formulating science popularization plans based on one's own experience and feelings, and lacking an understanding of the educational background of the place where science popularization work is carried out, will ignore the actual needs of the people to a certain extent, and cannot bring the people a sense of actual gain and satisfaction, which is not conducive to cultivating enthusiasm for science learning.

Most of the staff of some popular science organizations are volunteers recruited from college campuses. These volunteers come from various majors and ethnic groups, and their understanding of popular science content is very different, and their perceptions of how to lead students into special knowledge fields such as the atmosphere of popular science are also uneven. The masses in minority areas will be influenced by their own culture in their lives and thinking, and the people's religious beliefs, customs, and other factors must be taken into account in carrying out local science popularization work[3]. If the science popularization organization does not train volunteers under the guidance of professionals, and ignores the differences in the life and thinking styles of the people in some ethnic areas, the volunteers will lack the experience and methods of communicating and guiding with the children in the science popularization classroom and hands-on practice, and the students' physical feelings will decline, and the overall sense of effectiveness will be reduced, which is not conducive to the effective implementation of science popularization.

Affected by the above two factors, the content of popular science is out of touch with the actual needs of residents, and the results of popular science work are greatly reduced. If we want to truly achieve effective science popularization, university organizations must be down-to-earth and start all work from the actual situation.

### **3. Measures to Improve the Current State of Science Popularization Education in Universities**

#### ***3.1 Increase Funding Allocation***

According to the requirements of the Outline of the Action Plan for Scientific Literacy for All (2021-2035) issued by the State Council in 2021, colleges and universities should actively support and encourage popular science education, especially to increase investment in popular science funding. Colleges and universities should attach importance to popular science education activities and increase special funds for popular science in remote areas, so as to facilitate the development of popular science activities.

Governments at all levels and colleges and universities should take the initiative to broaden funding channels. One of the key measures is to include science popularization funds in the special budget to ensure that there is a "place" for education funds in the investment of science popularization in remote areas, and then gradually increase the level of investment in science education. Another key measure is that universities should actively seek the participation of social funds and raise funds through various channels, for example, universities should strengthen cooperation with enterprises and establish long-term and stable cooperation mechanisms. Through cooperation with enterprises, we carry out popular science education activities to achieve a win-win situation for both parties. In addition, the establishment of a diversified popular science investment mechanism is the inevitable choice for the great development of popular science in China, popular science investment does not only refer to the investment of social organizations and enterprises in popular science funds, but also includes the support of enterprises and

social organizations for popular science through donations, so the development of popular science in China must fully mobilize the enthusiasm of all parties, and gradually form a diversified investment channel[4]. It is necessary to strengthen the government's investment in public welfare science popularization through system construction, and can also guide enterprises to increase investment in science popularization through policy means to ensure that enterprises can get financial support for science popularization activities in the process of cooperation between universities and enterprises.

### ***3.2 Implement Diverse and Innovative Science Popularization Formats***

In order to solve the problem of relatively single form of popular science at present, the strategy of diversification of forms can be adopted. Colleges and universities have a full range of discipline talents and resources, and can use modern scientific and technological means such as the Internet, social media, virtual reality, etc., to innovate the presentation of popular science content and convey scientific knowledge in the form of multimedia. Get to the hearts of your audience in a way that is easy to understand and not new. For example, the production of popular science documentaries, film and television dramas, short videos, etc.

As the main position of quality education and popular science education, schools should make full use of their own teaching resources to actively create a platform for the promotion and practice of popular science knowledge for the implementation of popular science activities in colleges and universities[5]. Set up "popular science experimental classes", "popular science laboratories" or organize students to watch popular science documentaries carefully to improve popular science reserve knowledge and other forms of popular science, igniting students' enthusiasm for popular science knowledge research. The learning of the "popular science experimental class" and the professional knowledge course should be organically unified, not only does not occupy the time of the professional course, but also maintains its continuity, so that students can verify their ideas in the experiment, cultivate students' awareness of scientific inquiry, and ensure that students have clear ideas when carrying out science popularization, and popularize scientific knowledge to primary and secondary school students in a simple and clear way.

Secondly, all kinds of popular science activities can also be held to guide students from inside the classroom to outside the classroom, from the school to the outside of the school, so that students can use their brains and hands more, and open the source of students' wisdom. Since the implementation of the strategy of "rejuvenating the country through science and education" and the "scientific outlook on development", China has promulgated and implemented the Law on Science Popularization, increased the infrastructure construction of public units for science popularization, and established an organizational system for science popularization units with a wide range of coverage, with various science popularization museums all over the country. Science museums, such as science and technology museums, museums, science and technology activity centers, etc., should give full play to their role in popular science education, colleges and universities can cooperate with such popular science units to carry out a series of popular science practice activities, including science and technology exhibitions, theater performances, etc., to improve the interactivity of activities, attract the participation of primary and secondary school students in remote areas, and open up a student popular science practice base. These comprehensive measures are expected to break the singleness of the traditional form of popular science, make popular science more innovative and attractive, and better meet the needs of different groups of people.

### ***3.3 Improve the Construction of the Science Popularization Evaluation System***

After many optimizations and reforms, science and technology evaluation has played an important role in promoting and promoting the progress of national science and technology, but with the different social economy and science and technology development status of the country, the problems and disadvantages of science and technology evaluation are increasingly revealed[6]. In terms of evaluation mechanism, the university ignores the academic achievements and values engaged in the transformation of scientific and technological achievements and the popularization of science, and lacks incentives, and the guiding policies for science and technology to support teaching and the cultivation of innovative talents are not clear, and the incentives for those mainly engaged in teaching are limited. In addition, due to the intensification of competition in colleges and universities, the main energy of university managers is focused on the quality of professional personnel training and the scientific and technological achievements and teaching achievements of specific disciplines, so that they do not pay enough attention to the popularization of science that has nothing to do with the teaching quality evaluation system.

In order to improve the enthusiasm of college teachers to participate in the popularization of science, the results of science popularization work should be included in the scope of scientific research achievements of college teachers themselves, which not only makes up for the shortcomings of scientific research achievements, but also expands the field of scientific research of teachers[7]. In addition, colleges and universities should actively provide resource support, including funds, venues, equipment, etc., to reduce the practical difficulties for teachers to participate in science popularization work. Through these measures, we can stimulate college teachers to actively participate in science popularization work and improve the overall level of science education in colleges and universities.

Finally, as an important force in the popularization of science, teachers in colleges and universities should be supported and encouraged by the state, and the state should pay more attention to the popularization of science, and introduce as soon as possible the policy of mobilizing teachers in colleges and universities to actively participate in the popularization of science, and at the same time try to allocate funds for the popularization of science for teachers in colleges and universities, and provide a high degree of financial support, so as to not only improve the sense of competition among teachers in colleges and universities to participate in the popularization of science, but also mobilize the enthusiasm of teachers in colleges and universities to participate in the popularization of science.

### ***3.4 Deepen Science Popularization, Pay Attention to Actual Needs and Professional Training***

Over the past 7 years, our team has continued to carry out science popularization activities in the western ethnic areas relying on the Sichuan Provincial Aerospace Model Science Education Base and the key Laboratory (Southwest Minzu University) of State Ethnic Affairs Commission, covering more than 40 counties and cities, more than 60 primary schools, and about 58,202 students. So far, the team has carried out science popularization activities in 6 provinces including Tibet, Qinghai, Sichuan, Hunan and Chongqing, more than 40 counties (cities) such as Qinghai Hainan Tibetan Autonomous Prefecture, Liangshan Yanyuan and Xiangxi Fenghuang, and more than 60 primary and secondary schools such as Chengguan Primary School, with a cumulative time of 1,080 days of science popularization and a total of direct benefits 54,300, with a total of 162,930 indirect beneficiaries, with an average annual increase of 27,155 person-times. Therefore, in response to the problem of ignoring the actual needs of the people in popular science content, our team has accumulated experience, made up for the shortcomings, and proposed the following improvement measures:

(1) Colleges and universities should fully understand the actual situation of the target area before formulating a science popularization plan. This can be done through field trips to gain a deeper understanding of the local population, and online forms such as surveys can be used to gather people's opinions and needs. This helps to ensure that popular science content is more relevant to local needs.

(2) Professional training should be provided for volunteers in science popularization organizations, especially in ethnic minority areas. This includes training in the culture, religious beliefs, customs and habits of ethnic minority areas so that volunteers can better understand and respect the local way of life. The training should also cover the transfer of popular science knowledge and methods of effective communication with students from different backgrounds.

(3) In addition, colleges and universities should set up a feedback mechanism after the popular science activities to collect feedback from the public and students. Through this mechanism, it is possible to understand the effectiveness of popular science activities and the satisfaction of the audience, so as to adjust and improve the popular science program in a timely manner.

(4) Colleges and universities should establish good cooperative relations with local governments, schools and communities when carrying out science popularization work. The plans of popular science should be developed with local partners to ensure better integration into the local culture and to improve the local adaptability of popularization of science.

## **4. Conclusion**

Higher education science popularization plays a crucial role in enhancing the scientific literacy of the general public, especially in remote areas where science popularization education is of utmost importance. However, in practical implementation, there are still some challenges faced by science popularization education in universities, including insufficient funding, a limited variety of formats, and an incomplete evaluation system, which hinder its development.

To address these issues, universities should increase funding allocation, explore diverse and innovative science popularization formats, and improve the evaluation system. Through these measures, universities can better leverage their strengths in science popularization education, inspiring more enthusiasm among primary and secondary students, and contributing to the cultivation of a more scientifically literate society.

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