

THE BIG HAND THAT PEELS OFF THE APPLE SKIN FOR THE LITTLE ANTS: A CASE STUDY OF CAS-ASPIRE

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ABSTRACT

Using communications theories, this paper analyzes how the retiring scientists of Chinese Academy of Sciences--Association of Speakers in Public Interest of Retired Experts (CAS-ASPIRE), popularize scientific knowledge among middle school students, considering the currently backward situation of scientific education in Chinese schools. Through face-to-face interactive lectures, multimedia and demonstrations, the scientists pass on to the youngsters their scientific knowledge, methods and spirit, hoping their efforts will inspire these youngsters' interest in science. Walking out of their labs onto the campuses, the retiring scientists compensate for the weaknesses of current regular science education and teaching in Chinese schools. As the case of CAS-ASPIRE has shown, these retiring scientist can and will demonstrate their special advantage in the science popularization work. The campaign is a successful breakthrough of science popularization. Its strategies can be promoted, learnt, and shared, and is an opportune occasion for science and technology communicators to expand trans-culturally.

KEYWORDS: CAS-ASPIRE, science popularization, science reports, youth

I. INTRODUCTION

1.1 Background

A little ant ran upon an apple having no idea where it should bite. Fingers peeled off a piece of apple skin, from which the ant tasted sweetness and entered into the apple. The big red apple is the treasure store of scientific knowledge. Popularization of science is like peeling off the apple skin, which opens a door for the youngsters. This is the contribution of The Chinese Academy of Sciences--Association of Speakers in Public Interest of Retired Experts (CAS-ASPIRE).²

CAS-ASPIRE established in September 1997, currently has 25 members, the majority

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² See Introduction to CAS-ASPIRE, 2005, p. 1

of whom are retired experts and scientists from the China Academy of Sciences. Zhong Qi, the group leader of CAS-ASPIRE, said that she was the vice chairperson of the CAS Retiring Scientists Association after retirement. In September 1997, one of the vice presidents of Chinese Academy of Sciences told her that he wanted to organize retiring scientists to popularize science. Zhong suggested an Association of Speakers in Public Interest of Retired Experts.

As a retiring scientist and experienced leader in the popularizing of science and technology in the Chinese Academy of Sciences, Zhong initiated the organization and studied the objectives and membership qualifications together with Lu Shouguan and Wang Yongle. Without an office or equipment, the CAS-ASPIRE was started with only 50,000 RMB in hand. As for the reason why the association is aimed at middle school students, Zhong explained as follows: "Middle school years are the crucial period in the development of one's worldview. Our work would be of great value to the extent that it helps in the shaping of young people's outlook." Eventually, the Education Committee of Haidian District of Beijing Municipal responded to the initial proposal, the first step taken by CAS-ASPIRE. Later, they gave their first talk in one of the middle schools of Haidian District with the help of the Haidian Association for Science and Technology.

Over the past eight years, CAS-ASPIRE have traveled to 21 provinces and cities in the country and organized nearly 2,000 popular science reports, either arranged by the China Association for Science and Technology or the Chinese Academy of Sciences, or invited by people all around the country; up to 910,000 people have already attended their lectures.³ During the five-year "Big hand holding small hand, Science reports journey to the West", co-organized by the China Association for Science and Technology and the Chinese Academy of Sciences, and started in 2000, they have given about 700 scientific popularization reports in the western regions of China, including Xinjiang, Tibet and Ningxia, aiming at popularizing science knowledge among teenagers there.

1.2. Objectives

- a) Ignite youngsters' curiosity about nature, inspire their interest in and lead them into the edifice of science.
- b) Introduce some famous historical scientific events and famous experiments, as well as something about the diligence and creativity of scientists, including scientists' own experiences, which are not restricted merely to the passing on of scientific knowledge. Stress the importance of the scientific method, the way of scientific thinking and the scientific spirit, in order to equip youngsters not only with the necessary scientific knowledge but also with the ability to grasp scientific methods and the creative thinking necessary to the scientific spirit.
- c) Through scientists' vivid and lively lectures, let students themselves encounter science not as abstract theory or dull sermonizing but as a process of discovery that is

³ See Introduction to CAS-ASPIRE, 2005, p. 2

closely linked to our daily life. Cultivate in youngsters the good habits of learning science, loving science and using science.

d) Briefly introduce the youngsters to the latest findings and trends in science and technology both at home and abroad in order to let them understand that social development is to a large extent due to the development and advance of science and technology. Let them have a precise and comprehensive knowledge about science, knowing that science is a double-edged sword.

e) Objectively introduce the true development of science in China and inspire students' national patriotism and social responsibility. Emphasize that scientists have morality, justice and social responsibility. When they undertake scientific research or create inventions, they need to take the whole mankind and society into consideration.

1.3. Significance

The case of CAS-ASPIRE is a typical activity of scientific communication. Theoretically speaking, probing into the strategy, procedure, and the communication effectiveness of this case can be favorable to the study of the validity of scientific communication. Practically speaking, it is a successful breakthrough of science popularization, which bears great practicability. Its strategies can be promoted, learnt, and shared, an opportune occasion for science and technology communicators to expand trans-culturally.

II. THE SCIENCE COMMUNICATION PROCESS

2.1 The strict “three-step examination”---the requirements for speakers

There are a great number of scientists in the Chinese Academy of Sciences, but not all of them are suitable to lecture to middle school students. Therefore every scientist, scholars or academicians, is selected by the “three-step examination”: the first step is the inspection of the outline of their lectures; the second is a small rehearsal; the third is feedback from the audience. What Mrs. Zhong Qi values most is the scientist's expressiveness and caliber of their language. Such strict criteria can pave the road of success for CAS-ASPIRE.

2.2 Send the “menu” to middle schools---the ad for CAS-ASPIRE

The lecture is "I only talk about what you want to know", instead of "I talk, you listen." CAS-ASPIRE sends “menus” to the target schools, in which you can find each speaker's brief introduction and his/her outline of the lecture. It is the school that decides to invite which speaker to give the lecture, not CAS-ASPIRE. The seller's market is replaced by the receiver's market and the audience's autonomy is activated. In this way, each of group members makes a great effort on his speech in order to win the preference of the school.

2.3 Lectures on the campus---the use of communication strategies

The science of communication, as a communication process of integrity and validity, requires that the communicator successfully pass on knowledge to the receiver. Then

the receiver responds in turn with feedback to the communicator. This is a procedure of mutual communication. The communicator tends to make the receiver notice the information, understand the content and further to influence the receiver's attitude or make the expected response.⁴ To make the communication clear and understandable is the common object for both the communicator and the receiver.⁵

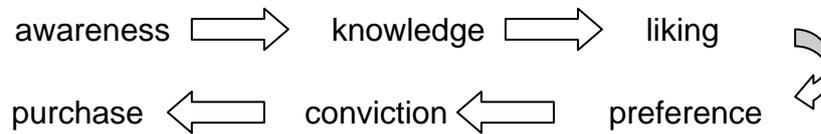


Table 1 A model for predictive Measurements of Advertising Effectiveness
 Resource: Adapted from R. Lavidge and G.A. Steiner, “ A model for predictive Measurements of Advertising Effectiveness,” Journal of Marketing 25(1961): 61, published by the American Marketing Association.

The table describes a model of advertising effectiveness; it can also be taken as the process of science communication. In this case, scientists are the communicators and youngsters are the receivers. There are three main steps:

○ Awareness

In order to ignite youngsters' awareness, scientists have summed up a special technique which they call “opposite teaching”. That is, they often begin their speech with a question to draw the students' interest and inspire them to think. The background of the question is familiar with them. For example, when Mr. Wang Ninghuan gives a speech, *Marvelous Materials and New Technology*, he first asks the students if they have seen the movie *Titanic*. The students reply “Yes”. He responds with, “How could such a big strong ship made of steel and iron be mortally gashed by mere ice?” This question draws the students' attention and curiosity to seek an answer.

○ Knowledge

It is not an easy thing to pass on to teenagers the often abstract, confounding and dull knowledge that is science. In order to solve these problems, the scientists work out a mode of thinking and wording that can be accepted by middle-school students. They explain profound ideas in a simple way. Professor Wang Ninghuan, who gave the report on *Magic Material and High Technology*, displayed a pair of scissors of made of china. The students felt so curious and interested that everyone wanted to touch it. Some of the students even tried to manicure their nails with the scissors. When professor Sun Wangru delivered a report on *The Characteristics and Development of the Modern Battle Plane*, he brought several plastic model battle planes, and the children were extremely excited to see them. This way of presenting scientific knowledge brings about knowledge through the active participation of the learner.

⁴ See [Am] Werner J. Severin /James W. Tankard, Jr: Communication Theories: Origins, Methods and Uses in the Mass Media, Fourth Version, 2000, P. 71.

⁵ See [Am] Werner J. Severin /James W. Tankard, Jr: Communication Theories: Origins, Methods and Uses in the Mass Media, Fourth Version, 2000, P. 70.

○ Feedback

To gain feedback from the teenagers is the final process of communication. There is a question period after the two-hour lecture, during which the scientists patiently explain questions and doubts put forward by the students. Sometimes, some students are invited to the stage to make a small speech of their own. At the same time, the audience is engaged in discussion with the scientists. Sometimes, the school will organize a small meeting between scientists and students after the lectures, providing the students the opportunity of close access to the scientists. After the lecture, the group leader Mrs. Zhong Qi will present the local school envelopes posted with stamps, encouraging the students to respond to the scientists in writing. Through such interactive activities a superior communication between scientists and audience is achieved.

Above all, the scientists do not overemphasize the systematization and theorization of science nor do they compress the knowledge and infuse it into the children in a force-feeding style but try to draw the interest out of the children, peeling a bit of the big apple of science and helping the small ants to taste the sweetness of knowledge.

III. RESULTS ACHIEVED AND EVALUATION

3.1 Results achieved

The case of CAS-ASPIRE is a great success.

a) Over the past eight years, they have traveled to 21 provinces and cities in China and organized nearly 2,000 popular science reports; up to 910,000 people have already attended their lectures.

b) Teachers and students were fascinated with the excellent reports given by ASPPIRE. The fancy slide-shows and lively demonstrations greatly aroused the audience's interest. The scientists' reports were always followed by a number of questions raised by the audience. The students and teachers on hand all experienced the glamour of science. In addition, through close exchange with the lecturers, many students began to discover for the first time their interest in science.

According to the introduction by Director Zhong Qi, one of the students who was from Shenzhen Overseas Chinese Middle School made a phone call to his parents after listening to Professor Sun Wanru who is the researcher in Institute of Microbiology at the Chinese Academy of Sciences. The boy told his parents, "I have changed my plans for college study. I want to enroll in biology!" Another student who was from Shizuishan No. 1 Middle School in Ningxia wrote a letter to the CAS-ASPIRE, saying, "Previously I could not understand biology. I felt totally lost in studying this subject and had no interest in it. But then Professor Sun came and presented a report, *How Biological Technology Has Changed Our Life*. He talked about the history and future of cloning and the benefits and harm it might bring to human beings. Listening to his report, I fell deeply in love with biology and I have

made up my mind that I would like to try hard to make a contribution to bioscience in the future.”

Some of them even later contacted the scientists through mail or email, asking various questions concerning science. In this way, the scientists have made friends with these students and have gradually formed deep friendship and established confidence in each other.

c) As a result of these successes, the project is spreading widely around the country. Not only is ASPIRE popular among teachers and students, it receives support from local governments as well. Wherever the tour stays and gives reports, they infuse into the community an atmosphere of “studying science and loving science”. These science tours reverberate across the country. People from many other provinces and regions have sent telegrams or telephoned to praise and support the tour and invite these scientists to pay a visit there for lectures. They are warmly welcomed everywhere and their footsteps have already covered most parts of China. In 2002, Leader Zhong was met by Vice Premier Li Lanqing.

3.2 Evaluation

Scientifically speaking, every communication process is made up of the communicator, communication content, the channel, the audience, and communicative techniques. Every element can greatly increase the effectiveness of communication. Being the result of the interaction of all these elements, the effects of communication should be studied with respect to the following five aspects.⁶ I evaluate the communicative effect of CAS-ASPIRE from these five elements:

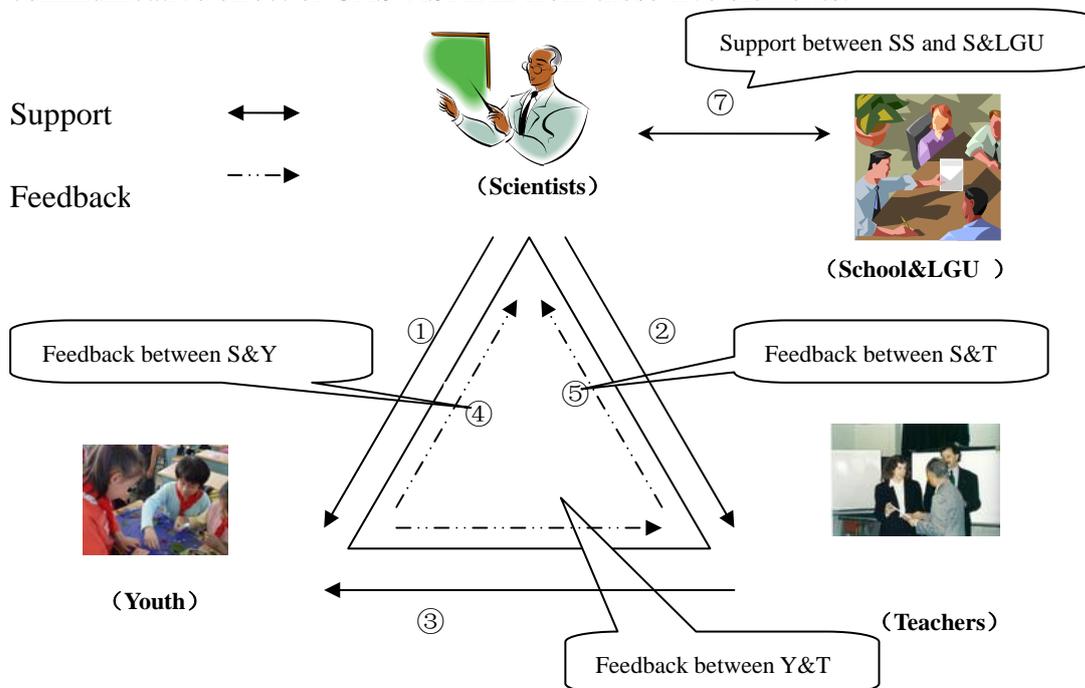


Table 2 Support and feedback between different participants in the science lectures

⁶ See Guo Qingguang: The Course of Communication, People University Press, 2002, p. 191

Firstly, the communicator

The function of the scientists is apparent. These scientists are authorities in teaching the scientific method and the scientific spirit. It is insufficient for our country's current education system alone to undertake the teaching of the scientific method and the scientific spirit. Most students "know" rather than truly understand science, especially the scientific method and scientific spirit. By communicating face-to-face with middle school students, scientists can do a lot to remedy the deficiency of our current science education. Because these scientists set a good example, schools will in the future pay more attention to the effective teaching of the scientific method and spirit.

Secondly, the communication content

What the lectures cover is up-to-date. The content is not only knowable and easy to understand while being scientifically grounded, but also interesting and fresh. Unlike traditional science popularization with its over-emphasis on scientific facts, CAS-ASPIRE stresses the passing on of the scientific method and spirit. The scientists underscore the newness of what they are telling the students and timely add the latest information and pictures to their lectures. Their demonstration disks have been revised many times. Meanwhile, the scientists also introduce students to their own research work, exemplifying the painstaking and persevering spirit underlying their pursuit of scientific innovation generally. This is intended to lead the student listeners to build for themselves a healthy and progressive outlook on life.

Thirdly, the channel

During the lectures, monologues are replaced by various multimedia forms, for example, demonstrating points through films and cartoons, supplementing the lectures by illustrations and examples, and an accompanying theoretical explanation by students' hands-on practice afterwards. The lecture is accompanied by active demonstrations, engaging the students in the search for meaning and promoting interaction between the lecturer and the audience. All these efforts contribute to a better impact on the audience.

Fourthly, the audience

The main target audience is teenagers. In order to cater to the needs of students at different ages, reports and seminars are given in three sessions, respectively designed for primary school students, junior high school students, and senior high school students. Furthermore, for the campaign to proceed in an effective manner, an extra report session is prepared for teachers to improve teachers' scientific literacy.

Fifthly, the communication techniques

Our retiring scientists have successfully combined theoretical explanation with manual operation and have promoted education through entertainment. The atmosphere of their reports was very warm and active. The children benefited a lot from the reports.

To sum up, a new type of activity has been implemented, changing the traditional one-way communication into two-way communication. It encourages the mutual understanding of teenagers and scientists rejected the traditional one-way top-down manner of learning. However, an evaluation system of the effects of scientific communication is needed. For example, there can be a survey before and after the lectures on the students' attitudes towards science. Comparing the differences, the scientists can see how much the lectures influenced the students.

IV. DISCUSSION

In accordance with the actual Chinese situation, CAS-ASPIRE is a successful case of scientific communication. As it has shown, these retiring scientists can and will demonstrate their special advantage in the work of science popularization. They set an excellent example for scientific communicators. Their core principles are summarized as following:

- a) Strict selection. It is due to Leader Zhong's extremely strict selection process that the quality of each report is ensured.
- b) Plain life style. Zhong has a "Three No's" principle to enhance a plain and thrifty lifestyle, namely, no burden on local governments, no waste on dinners, and no gifts without good reason.
- c) The mechanism of interactions between scientists and youngsters ensures the effectiveness of scientific communication.
- d) Strong social responsibility among the retiring scientists has become the core spirit of the team. During the interview with several experts, they mentioned the word responsibility spontaneously concerning the question of why they wanted to join the ASPIRE. It is the strong social responsibility that draws so many scientists to the youngsters. The non-profit speech association delivers speeches out of purely social interest. All the members are willing to dedicate their scientific experience to the society and the children. No one quits the association within eight years.

The above four principles has paved the road of success for ASPIRE and should be shared by other scientific communicators. Now the objects of science popularization have been expanded to middle school teachers, college students and public servants from the original middle school students. The covered place is expanded from Beijing to the whole country too. Consequently, the association has been in need of new members and support from more scientists.

V. CONCLUSION

It is a wonder in China for 25 aged scientists to give 2,000 science reports in 21 provinces and in 8 years! The success can be hardly achieved without either the support of the governments, the local schools, or excellent leadership and team spirit. The activity is a successful case of science popularization in accordance with the present situation of China. Its wide influence goes beyond the activity itself, and it is

worth imitating and promoting for the benefit of all science communicators.

a) Scientists walking out of labs and into the western regions compensates for the weaknesses of current regular science education and teaching in Chinese schools. Covering such a long distance, these scientists hope that their efforts will enhance these youngsters' interest in science, equip them with necessary scientific knowledge and scientific methods, and develop their scientific spirit. These activities are also expected to promote the scientific awareness of teenagers in the region as a whole, and to speed up the development of science education for teenagers in the western part of the country. However, at this point, it is hard for current Chinese formal education to achieve this effect, and equally hard for middle school teachers.

b) The five-year westward journey of retiring scientists to lecture on science in remote areas not only meets these teenagers thirst for knowledge but also helps to balance the national distribution of knowledge resources, from the developed to the less-developed regions. The development of the eastern and western parts of our country is uneven. The western region is far behind the developed areas in the east, in terms of its economic situation, level of education, and the degree of scientific popularization. As the survey on public scientific literacy in 2003 shows, people in the west are 1.5% lower than the national level of 1.98%.⁷ Therefore the development of the backward western region needs the help and support of science, technology and culture from the east; it is the key target of our science popularization. Moreover, the youngsters are the beacon of hope for the west's development; they need our scientists.

c) At present, we have about five million people who have retired from their positions in scientific and technological research. This group of people is an important resource that we can rely on in science popularization work. They have left their positions but all of them were once first-class experts and talents in a particular scientific field. These people will serve an essentially valuable resource for our work. As the case of CAS-ASPIRE has shown, these retiring scientists can and will demonstrate their special advantage in the science popularization work.

d) The project inspires other scientists' enthusiasm for science popularization. For a long time, Chinese scientists have not been used to undertake science popularization, paying scant interest to it. Now older-generation scientists are becoming well known among all scientists, and set a good example for them to follow. Soon there will be more and more scientists taking science popularization as their own responsibility and will thus put more effort into this great enterprise.

Mr. Zhang, the principal of No.57 Middle School, once said emotionally, "I'm over 50 now and have heard many science popularization reports in my life; but I still remember the one given by Mr. Li Jing and Mr. Li Yuan on astronomy when I was in

⁷ See CAST: Public Scientific Literacy in China, 2003, p. 29

the sixth grade of my primary school. I was very impressed. Now I'm the principal of a middle school and want my students to sense the charm of science. We have built an astronomical observatory, a robot lab and invited scientists to give science popularization reports in the belief that a good science speech will have a great impact on the children's options in their lives

In short, a good science lecture can impact a child with a lifelong interest. The big hands give power to the small hands, and the small hands in return inject vitality into the big hands. The case of CAS-ASPIRE is a successful breakthrough of science popularization. Its strategies can be promoted, learnt, and shared, an opportune occasion for science and technology communicators to expand trans-culturally.

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