Comparison Study on China-UK Scientists' Engagement in Public Outreach Activities

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Abstract--**Nowadays, Scientists are supposed to have the obligation to inform public about what they are doing and what affect their research has to the society, and comparing with other professionals, scientists have incomparable advantages in pubic science communication activities. In China, scientists' engagement in public outreach activities has attracted more and more attention of both government and science communities in recent years. But Chinese scientists' engagement in outreach activities stays a lower participation rate comparing with western countries. At the meantime, UK universities and research institutes have abundant experience in promoting and supporting their scientists to get involved in public outreach activities.**

This paper conducted a comparison study between UK and China scientists' outreach activities. Two typical groups of researchers were selected from each country. The analysis was covering four dimensions in scientists' public outreach activities: the policy and regulation environment; the main forms and methods; the major content and range of audience; the incentives and evaluation of their efforts. From the comparison findings, the author intends to learn more about the status and local features of outreach activities in each country. At last, the paper will provide policy recommendations on how to promote more scientists to get involved in the public outreach activities, as well as how to improve the efficient and quality of outreach activities in China.

I. INTRODUCTION

Public science outreach, also called Education and Public Outreach (EPO or E/PO) or simply Public outreach, is an umbrella term for a variety of activities by research institutes, universities, and institutions such as science museums, aimed at promoting public awareness (and understanding) of science and making contributions to informal science education. Considering scientists are at the high state in science communication, they are supposed to play the role of discoverers, producers and creators of innovation. They are also the important social force of science popularization resources development. Most of them have got professional training and are aware of the latest trends of science and technology development. So scientists have incomparable professional advantages in science communication with others and have the most professional conditions to popularize science and technology. Because scientists get funds from public, they have the obligation to inform the public what they are doing and what influence their research has for the society and whole country.

Most countries around the world have consistent understanding of science community's role in science communication towards the lay public. The report published by the Committee of Public Understanding of Science in UK, named *The Public Understanding of Science*[1], mentioned that "it's the professional responsibility of each scientist to promote public understanding of science", and hoped that scientists "truly understand that it is their obligatory work also". The chairman of AAAS Green Wood called on all the American scientists "to do part time job in schools at all levels to participate in science education and promote public understanding of science" in the AAAS Annual Meeting.

In UK, public Engagement isn't something new that universities need to start doing: recent research has demonstrated how much engagement is actually already going on, with a survey of 22,000 academics in 2009 revealing that over 35% were involved in some form of outreach activity. However, despite enthusiasm for engaging with the public, there is compelling evidence that many staff and students in universities are not well supported or encouraged to work in this way. The Royal Society's report *Survey of factors affecting science communication by scientists and engineers' in 2006* [2]found that 64% of scientists said that the need to spend more time on research was stopping them getting more engaged and 20% agreed that scientists who engage are less well regarded by other scientists. *The 2010 report by the Science For All expert group* [3] identified how the professional culture of many academic institutions still inhibits engagement. And the *2009 ScoPE report* [4] also demonstrated that while many senior academics believe engagement is important, they don't encourage young researchers to do it, fearing its impact on their careers. It was exactly these kinds of challenge which led to the setting up of the *Beacons for Public Engagement initiative in 2008* [5] in UK.

China has also launched a series of policies to promote scientists' outreach activities. These policies could be divided into three categories. First category is comprehensive policies for science popularization, for example the *Outline of the National Scheme for Scientific Literacy* [6]. They all explicitly demand scientists to actively get involved in all sorts of science communication activities and encourage them to participate in science education and popular science writing. Second category is comprehensive Policy for Science and Technology, such as the *Outline of the National Program for Long-Term and Medium-Term Scientific and Technological Development* [7]. It emphasized that scientists should communicate with public about their work and information in the process of scientific research. Third one is specific industrial Policies for Science Popularization. They

give specific requirements to scientists for science outreach activities in different industries. The implementation of all these policies has set up a positive institute environment for scientists engaging in public outreach activities in China [8].

Although, UK and China governments have both conducted a series of policies to promote scientists public science outreach activities, there still have many difference in scientists' engagement in public outreach in UK and China [9]. To develop comparison study on the China-UK scientists engagement in public outreach activities, including policy and regulation environment, main forms and methods, the major content and range of audience, the incentives and evaluation of their efforts is significant for both of science and technology decision making process and public outreach activities' strategy selection in each country.

II. METHODOLOGY

In this paper, we took two groups from both UK and China to conduct a comparison research on the scientists' engagement on the Public outreach activities. In order to make two samples comparable, we selected a specific institution of higher learning to conduct analysis on the public outreach engagement of the scientists.

From the UK side, we took the University College London (UCL) as a case study object. Since 2008, UCL got support from higher education institutions (HEIs) to expand the public outreach activities. The Beacons for Public Engagement (BPE) is an initiative launched in the UK to support public engagement by higher education institutions (HEIs) [10]. The initiative is funded by the Higher Education Funding Council for England (HEFCE), Research Councils UK (RCUK) and the *Wellcome* Trust. Specifically, the initiative aims to promote excellence in public engagement and encourage a culture change within UK universities to recognize, reward and support public engagement. For the purposes of the BPE, HEFCE defines public engagement as: "bringing together Higher Education specialists and non-specialists to develop new channels of communication and mutual understanding. The 'public' includes individuals and groups who do not currently have a formal relationship with an HEI through teaching, research or knowledge transfer."

At the very beginning, Six BPEs were set up to pilot a program of public engagement activities. Each BPE was made up of one or more higher education institution, receiving £1.2 million funding over a period of four years (November 2007-December 2011). A National Coordinating Centre for Public Engagement (NCCPE) was also established in UK state level to coordinate the dissemination of learning from the initiative. UCL is one of the six Beacons for Public Engagement. In May 2008 a Public Engagement Unit (PEU) was set up within UCL, funded through the BPE. The remit of the PEU is to support activities which encourage a culture of two-way conversations between university staff (students), and groups outside the university. The UCL Public Engagement Strategy states that public engagement includes both speaking and listening, offering benefit to all parties involved (e.g. staff, students, and "public" groups). Public engagement at UCL currently falls into six broad areas: Telling public groups about our work; Supporting communities with our expertise; Nurturing a society in which the next generation want to take part in research, teaching and learning; Letting people outside the university contribute their research and knowledge to our program; Taking part in dialogue about the direction of our research and teaching; Creating knowledge in collaboration with communities and interest groups outside the university. Based on a literature study, this paper reviewed the public outreach activities conducted by UCL staffs and students during May 2008 to December 2011.

In terms of China scientists, the analysis is based on a face to face interview to scientists from the State Key Laboratory of Geohazard Prevention and Geoenvironment Protection (SKLGP) in Chengdu Institute of Technology (CIT). The State Key Laboratory of Geohazard Prevention and Geo-environment Protection (SKLGP) is located in Chengdu, Sichuan province, West Central China. SKLGP is the only state key laboratory in the field of engineering geology in China; it focuses on providing theoretical, technological, and educational support in reducing the societal impact of geo-hazards in China, particularly in southwest China. SKLGP has a young, energetic, innovative and cooperative faculty staff, including: 5 emeritus professors, 52 permanent research fellows and 30 assistant professors and researchers, with an overall average age of 43. SKLGP launched the first Open Day in 2009 on the 1st anniversary of WenChuan earthquake. This study interviewed SKLGP scientists' motivation, fund, methods and evaluation in public engagement activities.

III. SCIENTISTS' ENGAGEMENT IN PUBLIC OUTREACH IN UCL

A. Organizational structure and management for public outreach activities in UCL

An independent Public Engagement Unit (PEU) has been established within UCL to support staff and students to involve members of the public in their work [10]. In the period 2009-2011 the core PEU team existed of: Head of Public Engagement (full-time position); Public Engagement Coordinator (full-time position); and Evaluation Officer (part-time position).The PEU works to support activities which "encourage a culture of two-way conversations between university staff and students, and people outside the university." The role and remit of the UCL PEU is summarized below, covering six broad areas of operation within the institution:

- Funding and facilitating public engagement projects. Provide grants and support for public engagement projects;
- Networking and brokerage. Build networks of public

engagement practitioners, researchers, external organizations and Beacon partners;
- Training and mentoring. Develop and promote training and mentoring programs to support practitioners within the institution;
- Support and advice. Develop and publish online guidance for those engaging with public groups across UCL;
- Strategy. Develop and communicate a UCL Public Engagement Strategy with the aim of enhancing the value and increasing the effectiveness of the university's work in public engagement;
- Reward and recognition. Organize an annual scheme of awards rewarding staff and research students for achievements in public engagement.

Throughout the life of the BPE program there has been continuous support from a number of staff linked to the initial bid for funding, including the Vice-Provost (Academic & International) and the Director of Museums and Public Engagement. The UCL Public Engagement Steering Group was set up following the BPE award. The 20 members of the group represented a range of sectors, organizations and disciplines. The diversity of members aimed to provide a spectrum of voices within and external to UCL. The steering group membership was impressive, with an inter-disciplinary spread of expertise and range of public engagement experience (in terms of audiences and modes of engagement).

The intended role of the PEU was to facilitate and broker collaborations between these core partners. However, the practice of partnership has been very different than initially anticipated in the original program bid. The working links failed to develop in the formal way as planned: partnerships instead developed around specific audiences, projects, and initiatives. The PEU has had a long term impact in supporting institutional commitment to public engagement. It has been successful in creating an independent structure and model for public engagement, and has addressed many barriers traditionally faced by HEIs undertaking public engagement. The PEU has also driven a culture change at UCL both at a strategic and grassroots level, which has led to a longer term commitment to public engagement through the continuation of the unit. The PEU can now build upon the success that the Beacons program has allowed, and focus on a more targeted approach within the Schools and Faculties.

B. Summaries of funding and diversified activities for public outreach in UCL

The achievements of the PEU, from the period of its inception in May 2008 until December 2011, are summarized as following:
- 91 public engagement projects have been funded through various grants.
- One Beacon Fellowship has been completed and five public engagement mentors have been appointed.
- A total of 237 partner groups/organizations have been linked to the program.
- Creation of the Annual UCL Provost's Awards for Public Engagement.
- Creation of the Annual UCL Public Engagement Symposium.
- Over 37,560 people have attended program and project activities.
- Over 1600 UCL staff and students and 530 people outside UCL, have taken part in training and mentoring on public engagement.
- £98,136 additional funding has been received from external agencies to support projects facilitated by the PEU.
- Advice and support has been provided on 47 public engagement and research funding applications to external bodies. These have been awarded funding totaling over £10 million.
- 37 Bright Club events have been delivered, and attended by approximately 3,933 people.
- 60 Bright Club podcasts have been created with an average download figure of 1,955 per episode.
- Creation of the Bite-Sized Lunchtime Lecture series featuring 44 speakers over three academic terms.
- Development and approval by the UCL Senior Management Team and UCL Council of a UCL Public Engagement Strategy.
- Public engagement is now included as a requirement in the UCL academic staff promotions criteria.

There have been 9 funding streams in operation over the life of the program, including: Beacon Bursary, Innovation Seed, Fellowship, REVEAL Competition, Train & Engage, Step Out, Beacon Bursary Dissemination Scheme, Bloomsbury Festival. Each funding scheme has specific aims, for example the Beacon Bursaries funding scheme provides small grants of up to £1,500 to support projects that will help staff and students to connect their research or teaching with people outside UCL, whereas the Train & Engage funding scheme was an interactive, learning-by-practice training scheme for arts and humanities postgraduate students from UCL and Birkbeck to turn their ideas for public engagement into reality.

C. Attitude and Motivations to Public outreach activities in UCL

The organizers of public outreach activities in UCL believed that Staff enjoyment of public engagement activity continues to be a driving force behind much public engagement work. There is a wealth of evidence from across the evaluation-from observations, project learning and evaluation reports, interviews-that staff and students in UCL enjoyed activities immensely and looked forward to them. Staff and students involved in public engagement activities also articulated benefits in terms of things they had learnt.

One UCL project leader at the end of project said that: "The work of the Bentham project has helped to stimulate the Laws Faculty to become more involved in public engagement.

Project staff spoke to the Faculty about their experiences; these experiences will also feature in a new Laws Faculty intranet site for staff as well as an external site about public engagement explaining what it is and how to do it." Although enjoyment and learning have been key factors behind public engagement activity, linking this activity to research and teaching has been a key objective.

IV. SKLGP SCIENTISTS' ENGAGEMENT IN PUBLIC OUTREACH ACTIVITIES IN CHINA

A. Institutions and organizational structure for public outreach activities in SKLGP

SKLGP in Chengdu Institute of Technology (CIT) has established a mature institution and management system. The scientific board of SKLGP developed *Regulation on administration of public outreach activities* to stipulate SKLGP strategy on public outreach activities. Before each year's Public Open Day, the administration department of SKLGP will release the opening information via various channels, including traditional media and websites. This *Regulation on administration of public outreach activities* clearly defines six aspects of the public outreach activities: the opening schedule to the public and relevant audience, content and forms of public outreach activities, organizational mechanisms, funding sources and evaluation and security protection.

On the opening schedule and audience, the *Regulation* clarifies that the laboratory should regular and irregularly open to the lay public at least twice a year, with a total opening time of less than ten days. To commemorate the Wenchuan earthquake, the opening days of first half year begin from 12th May (the date of disaster prevention and mitigation), and continuous open 5 days. For the second half year, the SKLGP should arrange opening day to the public during the summer holiday or during mid-September. SKLGP should release the schedule and requires to the public by newspaper and website 5-10 days in advance. The Lab opens to all sorts of public, especially technology enthusiasts, science and technology volunteers, disaster prevention and mitigation. At the meantime, the main audience of SKLGP is focusing on primary, secondary and college students.

As for the organizational structure, there is not an independent Public Engagement Unit in CIT. Furthermore, there is not an independent public outreach division in SKLGP as well. The management and organization function of public outreach activities was embedding in the comprehensive administration brunch of SKLGP. The Lab general-director Prof. Huang Runqiu, the vice-president of CIT as well, was appointed as the head of public outreach activities in SKLGP. And a deputy director in SKLGP takes specific responsible for open activities, activity planning and supervise the implementation every year.

On the sources of funds, public outreach budget is listed in the laboratory operating budget, there is none specific independent fund for public engagement end. At the same time, CIT doesn't provide fund for public outreach activities as well. Each year, public outreach activities organizer and director propose outreach plans along with finance budgets to the decision-making level of SKLGP. Generally, public outreach activities' spending items mainly include: publicity material printing, exhibition board, venue rental, consumption and transportation equipment, etc.

As for evaluation, after the implement of public open day, the relevant director has the obligation to summarize the effect of these activities, and then report to the lab director. During the opening hours, the Lab also need launch a series security measures to insure the safety of all of the audience as well as the Lab security.

B. Public outreach activity forms in SKLGP

During public opening days, the laboratory provides the public with rich and colorful popular science activities with the topics in disaster prevention and reduction, emergency safety. Based on laboratory facilities and intellectual resources, SKLGP provides a variety of popular science activities for the public, including a visit to the national key laboratory, science movie shows, interesting science games, etc.

During a visit to the lab in the process, the audience can understand and experience the earthquake vibration simulation, rainfall simulation, debris flow, landslide mechanism simulation, the numerical simulation of geological disasters, etc. On scientific reports and lectures, the researchers will interpret geological disasters knowledge to the audience, such as earthquakes, landslides and debris flows of knowledge. Scientists will also introduce how to escape when the earthquake happened and safety protective measures in face of geological disaster, and answer public questions. Except for indoor activities, SKLGP also recruit a number of audiences via hot line quiz, on spot quiz and online quiz. SKLGP will arrange the selected audience to Wenchuan County and conduct field inspections.

In order to allow the public to better understand the knowledge of disaster prevention and mitigation, for each visiting group ,there will be at least one professor to professional explain for them during the opening hour, SKLGP also sets up a lot of scientific display boards with rich content to promote public understanding of the science knowledge. Under the guidance of professor, visiting groups can visit to rock mechanics comprehensive test lab, modern soil mechanics laboratory, rock rheological test lab, physical simulation laboratory, etc. In landslide geological disaster prevention and control laboratory, scientist can also conduct simulation of groundwater and surface water under the joint action of debris flow formation for the audience.

C. Attitude and values on public outreach activities in SKLGP

After the Wenchuan earthquake in 2008, SKLGP staffs deeply realized their need and responsibility to carry out disaster prevention and mitigation of geological science related information. There is an internal consensus in SKLGP

that is opening to the public is not only the social responsibility, but also an important measure to collect and attract talent.

Among researchers who participated in this interview, some scientists are laboratory managers and academic leaders, some are the backbone of scientific research and some researchers are quite young in the team. They shoulder the heavy task of scientific research, and carried out for the public's science activities can neither increase the performance of their professional title nor compensated financially. Currently in the laboratory, to carry out science activities rely mainly on scientists own conscious participation and their strong social responsibility.

Even under the existing evaluation and incentive system, SKLGP scientists are still able to participate actively and enthusiastically to public outreach activities. In addition to participating laboratories organized events open to the public, they were often invited to participating disaster prevention and mitigation science activities initiated by schools, social institutions, media organizations and other units.

V. CONCLUSION

First of all, we found that establishment of support institutional commitment to public engagement will be great help to promote better public outreach activities in both UK and China universities. From the aspect of institution and strategy, we can tell significant advantage and insufficient in UK and China universities. The public outreach program in UCL represented a complex interplay of strategies as well as practical actions to formalize and embed public engagement within UCL. Primarily the establishment and continuation of the PEU has played a major role. The PEU supports and encourages public engagement across the institution, and this provides a foundation for both coordinated and increased public engagement activities within the institution. A core role of the PEU is to influence the long-term policies and strategies to encourage the incorporation of public engagement as a priority in UCL institution-wide mission statements and strategic plans. The UCL Council White Paper 2011-2021 has been developed in order to outline a vision and strategy for UCL for the coming 10 years. Public engagement is referred to within this paper:"UCL will continue its commitment to public engagement, in order to understand public concerns and attitudes, to inform public opinion and to address the barriers to adapting individual and mass behavior. We will make the outcomes of our research accessible and comprehensible to the public, and engage in responsible and mutually beneficial debate."

Comparing with UK colleagues, SKLGP didn't manage to embed the public outreach strategy into the university's overall strategy and institutions. There is no independent Public outreach (engagement) division in both lab-level and college-level, which is no doubt limiting the operation and performance of public outreach activities in SKLGP. Although, there is a lab-level regulation on public activities in SKLGP, there is no relevant document on university-level. The fund for public outreach activities is not an independent one. It is embedded with the administration budget of the operation fund of the lab, which brought great obstacles for scientists in SKLGP to bring public outreach activities to a better picture.

Secondly, the diversity pattern of activities is of great value to public outreach activities. When we take an in depth look at the patterns and forms of public outreach activities have been conducted by UK and China scientists in UCL and SKLGP, it is obviously that there are much more abundant forms of public outreach activities in UCL. According to the reports of UCL-BPE program, there were 10 plus sorts of different categories public outreach activities in totally 87 different projects (2008-2011). Apparently, in terms of both the quantity and the type of public outreach activities, UK scientists have accomplished a better job than Chinese colleagues.

The major reason for the limitation of Chinese scientists' exploration on variety of public outreach activities may lay in the insufficient fund and lack of personnel. But, when we look at the major form of Chinese scientists public outreach activities, there are more indoor educational style activities rather than a two-way communication pattern. While UK scientists added more entertainment and interaction factors into public outreach, which make the activity more attractive and interesting.

Thirdly, the motivation for scientists engagement in public outreach activities need to be improve in institution level, especially in China. The recognition and reward of public engagement is seen as a core component in embedding public engagement at UCL. The UCL has approached this in many ways. Firstly, through the organization and delivery of an internal annual awards program for public engagement, through the Annual Provost's Awards for Public Engagement. Secondly, through the active nomination of UCL staff and students for external public engagement awards, and finally, through the incorporation of elements of public engagement in the UCL promotions criteria: public engagement is included as a requirement in the academic staff promotions procedure at UCL.

Relatively speaking, China has very limited measures to promote scientists engagement in public outreach activities. Scientists' public outreach activities can neither increase the performance of their professional title nor compensated financially. Sometimes they will be blamed to ignore their proper occupation for getting involved too much in public outreach activities. Scientists' efforts in public outreach are significantly undervalued in existing scientific research and education evaluation system in China, which is considered to be the fundamental reason that constraint scientists' engagement in public outreach in our study. Many SKLGP scientists stated in their interviews that it was urgent to reform the existing scientific research performance evaluation system, and to bring outreach effort into evaluation system as an important appraised indicator. The rewarding pattern for

the motivation strategy for public outreach may become a feasible method to put into practice in China.

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