

Another Way to Develop Chinese Students' Creativity: Extracurricular Innovation Activities

Zhao Xiao-jiang

Mianyang Normal University, Mianyang, China

Zhao Xue-ting

University of Toulouse II Le Mirail, Toulouse, France

In China, improving students' creativity is becoming an important goal of modern colleges and universities, especially in the domain of science and technology. The efforts made for this goal can be observed not only in classroom, but also in activities and competitions which were held out-of-school. This paper will firstly give a brief description of creativity. Then, it will point out several constraints in Chinese creativity development, and introduce the characteristics and the advantages of extracurricular activities in STI (scientific and technological innovation). Concretely, the paper will take, in case, two national competitions, studying their influences on the development of creativity and innovativeness, and discussing some main problems. Some deficiencies of Chinese out-of-school activities in students' creativity development will be summarized. In conclusion, the paper will propose some advices to Chinese higher education in this aspect.

Keywords: creativity, STI (scientific and technological innovation), extracurricular activities, Chinese higher education

Introduction

As creativity development in students is an important content of "Quality-oriented Education Plan" of Chinese higher education (State Council of the People's Republic of China, 2010), Chinese colleges invest more and more researches of creativeness and innovativeness education. Firstly, the current paper gives the definition and the characteristics of creativity. Secondly, a presentation of main difficulties in Chinese students' creativity development is offered as a background. Thirdly, the paper introduces the Chinese extracurricular activities in STI (scientific and technological innovation): characteristic, advantages and deficiencies. Two national competitions are presented as successful cases. At last, the paper will offer some suggestions for the students' creativity development in Chinese higher education.

Creativity

One important feature of the science is innovation, whether it is the discovery of scientific laws, or it is the improvement of science and technology are inseparable from the innovation. The material civilization and the spiritual civilization of human society are both the results of innovation. Therefore, without the creativity of human mind, there would be no creative practice and creative result (Brodén, 2004). Indeed, the creativity is an essential part of innovation and invention.

Zhao Xiao-jiang, lecturer, Innovation Faculty, Mianyang Normal University.

Zhao Xue-ting, Ph.D. candidate, Ph.D. School CLESCO, University of Toulouse II Le Mirail.

In this paper, the creativity specially refers to the capacity of finding original solutions to a certain problem in sciences and technologies. More concretely, the creativity is a breakthrough in the traditional habit of thinking and logical rules, which illustrate the problem in new thinking directions and resolve the problem in new ways (Lubart, 2003).

The paper points out several main characteristics of creativity (Broden, 2004; Craft, 2001) as follows:

(1) Originality: Such thinking is beyond a fixed, intrinsic way of thinking which never had a new perspective in a new point of view to observe things, to understand things. It can raise new ideas and new theories that an average person does not have;

(2) Comprehensiveness: This kind of thinking is capable to give a comprehensive analysis of the problem from different angles, different levels, and is able to form new theories, and to re-integrate a number of elements in the thinking process, and at last, it can get new ideas or new conclusions;

(3) Divergence: During the process of problem-resolving, the creativity does not stick to one pattern of thinking. It is capable to extract, from a small amount of information and a large number of information, and to find ways to solve the problem from divergent directions.

The French psychologist and educator Lubart pointed out in his book *Psychologie de la CrEativitE* (Lubart, 2003): “elle est l'un des moteurs, sinon le moteur premier de la croissance économique et culturelle, et nos sociétés la valorisent ou prétendent la valoriser de plus en plus” (The creativity is one of the motors, even the premier motor of the economical and cultural growth, and our socialites valorize it or pretend to valorize it more and more).

Indeed, the training of creativity is one of the targets to be achieved in the Chinese education reform. Therefore, this target is difficult to attain in this country because of the old educative system. So, it is necessary to start with an analysis of Chinese education background.

Constraints of Traditional Classroom Education on Creativity

The backwardness of traditional education in educational concepts and teaching methods has restricted the implementation of creativity training in Chinese colleges (Chen, 2004). The paper summarizes some constraints in the following aspects:

(1) Inadequate teaching approaches. Most of Chinese teachers use teacher-oriented methods. They focus on irrigating “savoir” (knowledge) but pay no attention to transmit the “savoir-faire” (know-how). Chinese students cannot associate what they have learnt with what they can do. They have no idea that they can innovate and create;

(2) Backwardness of evaluating system. Most colleges and universities still have an old system of evaluation. Students can only pass paper examinations to assess what they have learnt. The extra-curricular evaluation is very poor;

(3) Teaching contents and curriculums do not match the needs of the modern sociality. In China, generally, the teaching content is too outdated. The teaching books have not been changed for even a few decades. There is no orientation of creativity development in these teaching materials.

However, it can be observed in China that more and more educators become aware of the restrictions of obsolete education system and try hard to organize extra-curricular innovative activities for students to develop their creative mind out-of-classroom (Feng, 2009).

Characteristics of Chinese Students' Extracurricular Activities in STI (Scientific and Technological Innovation)

Since the 21st century, extracurricular STI activities become an effective way to cultivate students' creative ability. They are various, such as "application of STI projects", "social surveys and research", "science and technology competitions", "technology works display", "student patents" and "company simulations". This kind of activity is a strong complement to "Chinese classroom education", which brings students and teachers out of traditional education boundaries and gives opportunities to Chinese students to put their knowledge in practice (Chen, 2004).

Compared with other research activities, extracurricular STI activities have some specialties as follows:

(1) Emphasis on the application of knowledge: Extracurricular STI activities are a solid and deep support to the classroom teaching. Through the participation in activities, students can better master the book knowledge and put what they have learnt into practice, and they also can use the knowledge to arouse their own interest in theories and skills (Feng, 2009). Via these activities, students can acquire scientific research methods, understand more about the concerning discipline and broaden their study horizons. This kind of activity can fully mobilize students' initiative of learning, so as to achieve the interaction of teaching and learning. It is effective in combining classroom teaching with innovation practice;

(2) Attention to the real value of outcomes: In China, many scientific and technological achievements of college students do not have real social and industrial values. Therefore, the extracurricular innovation activities focus on the productivity. Innovative activities should not be held just in campus, but also in companies, in research institutes, in schools, in which students can discover, refine and implement more projects of real value.

(3) Focus on the quality development of students: To develop the creative thinking of students, we should clarify the importance of the quality of creativity training. Activities not only have to develop students' creativity and innovative ability, but also have to hold the dimension of the quality of the innovative talents (Feng, 2009). So it is crucial to focus on the quality education of innovative subjects which are Chinese students in this paper, and to develop innovative capabilities with innovative characters. And this is the original intention of the extracurricular STI activities;

(4) Attention to teamwork developing: In China, teamwork is a very weak point in education. Since the 21st century, under the influence of Western countries' good educative approaches, Chinese educators become aware of the need of teamwork training. Extracurricular STI activities in many projects pay much attention to teamwork developing, and it is only through concerted efforts that the team can complete the task brilliantly.

Outcomes of Extracurricular STI Activities in China

Through the above analysis, the authors found that in the traditional classroom, the cultivation of creativity is difficult to be achieved, so the extracurricular STI activities have a unique advantage in this aspect, which can be used to develop the Chinese students' creative thinking and practice. Therefore, it requires the Chinese higher educators to well associate classroom education with extracurricular STI activities. Establishing a good extracurricular STI system shows an increasing significance for the reforms Chinese colleges and universities and for building an innovative country.

Firstly, through extracurricular STI activities, the students "learn, practice and acquire" (Chen, 2004). As

the participants of these activities must have a wide range of capabilities, they acquire a creativity which is also multi-angle and multi-faceted. Creative thinking is a breakthrough of the original and existing method, its premise is having a deep understanding of existing knowledge. Indeed, only when we have mastered the knowledge in a certain height, we can talk about innovation and a meaningful creativity. So, to carry out extra-curricular technology activities can not only help in developing Chinese students' creativity, but also play a strong role in the promotion of traditional classroom teaching.

Secondly, the authors know that any scientific research activity cannot be completed by one person, and it needs to be supplemented with other people's things, which requires Chinese college students to have a good teamwork skill.

Thirdly, participating in extracurricular scientific activities can be very good for Chinese students to integrate in the society in the future, because it requires students to change their previous ways of thinking, from the passive acceptance to an active integration process of knowledge. The college students who participated in extracurricular activities are transformed, from a role of heritor of knowledge to a real creator of social wealth (Dong, 2003).

Finally, the research activities need lots of inspiration, so the students try to be good at capturing the inspiration in the STI activities. Indeed, a lot of inventions and discoveries flashed after long hours of work and technological activities. The greatest scientists are always able to grasp the fleeting opportunity and capture the immeasurable influence of the inspiration for enhancing their creativity. In Chinese extra-curricular activities of STI, during the authorization and the conversion of the published papers, and during the competition and the awards of patents, Chinese college students enhance the sense of accomplishment, self-confidence, self-employment, entrepreneurship and competitiveness.

Successful Examples of Chinese Extracurricular STI Activities for Upgrading Creativity

In China, the university education of STI began in the eighties of last century. In 1989, 31 universities, like Peking University and Tsinghua University, jointly held the first "Challenge Cup" extracurricular scientific activities and technological exchanges, which marked that Chinese college STI ran into a real systematic development (Su, 2006). Today in China, "Challenge Cup" competition has become the banner of extracurricular STI, with the participation of nearly 1,000 colleges and universities.

Another well-known competition, "College NOC (Network Originality Competition)", was initiated and organized by the China Education Association, with State Intellectual Property Office, Ministry of Education, Science and Technology Development Center, China Association of Higher Education (Su, 2006) and China Association of Inventions. It holds national information technology innovation and practice activities. From the year of 2009 to 2011, it has developed into eight categories, 16 items, with the participation of more than 230 colleges and universities, having nearly a thousand candidates involved in technological innovation activities. Others national scientific and technological activities also abound.

These extracurricular STI activities demand an open, extensive selection, a rich source of topics, encouraging students to think with an open mind. For the Chinese universities of rich research resources, their students are inspired from teachers' research projects, so as to get a good subject of research.

In these competitions, good topics are mostly derived from everyday life, for example, losing cell phones is a widespread phenomenon. Indeed, it has been a very good topic—mobile phone anti-theft technology. Good topics require innovative themes and a high degree of social concern. The novelty is the prerequisite of

successful works. Equally, the degree of social concern is an important factor for successful works. To complete works requires students to discover, analyze and solve problems. "Challenge Cup", "Colleges NOC" activate Chinese players on the basis of the previous innovation, with new ideas and new angles to look at the original (Su, 2006). It demands that there is something new in the process of analysis and problem-solving innovation.

In "Challenge Cup" and "College NOC", the completed works reflect the activation of Chinese students' creativity. In fact, a lot of works have been used in practice. More and more talented students emerge in the activities. For example, among "Challenge Cup" winners, two have got the title of "Yangtze Scholars" (a high title for researchers in China), six were in charge of National key laboratories, and more than 20 become professors and doctoral tutors, 70% of the award-winning students continue studying for a higher level of education, and almost 30% of students go study abroad. And there are also one winner of the National Science and Technology Progress Award, the chairman of Beijing Vimicro Co., Ltd., Mr. Deng, the owner of "China Youth May 4th Medal", and the Ph.D. graduate student, Ms Hu Lingxin, of Nanjing University of Aeronautics and Astronautics. They all apply their creativity to their own field of work or research, which brought them both personal success and good social benefits.

Problems of the Extracurricular STI Activities in Chinese Colleges

The STI activities of Chinese students have made great achievements and also bring a lot of social benefits, with a high degree of social concern. However, due to the constrictions in the economy, the science-technology system and the Chinese education system, the education of science and technology innovation still have some problems to resolve (Chen, 2004):

(1) Still, a few students participate actively. Since the implementation of the examination-oriented education in China, there has been too much emphasis on the importance of the book knowledge. Consequently, Chinese students learn for exams. They are afraid of "wasting" time, money and effort on participating in STI activities. This mentality seriously hinders Chinese college students to take the initiative to participate in STI;

(2) Lack of good tutors. At present, Chinese students' STI has been developed in a good condition in the national key universities. But, in some common institutions and specialized colleges, the development is still slow, because STI does not get enough attention from these colleges. Their students lack basic skills in science and technology innovation, and they cannot find a good starting point. They need an experienced teacher to give guidance to them. These colleges do not have appropriate policies to encourage teachers to counsel college students in STI activities;

(3) Lack of material supports. Most of Chinese college students have no source of income, so schools and other relevant departments should give financial support to them. As Chinese students are regarded as of limited knowledge and experiences, the sociality considers that if the students lead the technological innovation activities, there must be some inevitable detours, resulting in a waste of money and time. Consequently, all parties put little enthusiasm in STI activities. So, it is very difficult for students to make a big difference in natural sciences and technical fields;

(4) Impetuous and careless organization of the activities. In some Chinese universities, due to the lack of professionalism and dedication in make extracurricular STI activities, the organizers are struggling to cope with the competitions and have no real passion for these activities. Many colleges and universities stop engaging in counseling, the student projects are submitted directly without selection or guidance. In consequences, Chinese students cannot get real benefit in innovation, such in "Challenge Cup" competition that the paper presented

previously (Su, 2006).

Some Propositions for Chinese students' Extracurricular STI Activities

Facing to the actual problems observed in Chinese extracurricular STI activities, the authors must attach great importance to carrying out profound analysis, in order to improve college extracurricular STI activities and enhance the creativity of Chinese college students:

(1) Raising the awareness and and relevant policies. From strategic perspective, colleges must realize the importance of college students' extra-curricular activities for creativity development. Indeed, they should consider the creativity development of students as a key goal.

(2) Improving the organization. The content of the college students' extracurricular innovation activities is full of richness. The activities demand that the technological innovation department and students work together. It is necessary to establish specialized departments for students, such as Innovation Institute, Association for Science, Innovation Centre, analog company, etc. (Feng, 2009). The establishment of efficient and practical activities by these organizations requires a variety of innovative teams and instructors;

(3) Enhancing the investment and relaxing the restrictions. Chinese colleges should put more investments financially and give more counseling to students (Feng, 2009). At the same time, they have to relax the restrictions of organization, such as collaboration with enterprises, which is the way that can not only solve the financial problem, but also increase the opportunities to integrate into the industry.

Conclusions

The paper has offered a resume of main difficulties in Chinese students' creativity development, given as a background. The traditional classroom hinders the Chinese students in innovation. The old exam-oriented education system blocks the students' creative mind. Then, the paper has presented main characteristics of the Chinese extracurricular activities in STI. It is clear that all the specialties of STI activities can supplement the insufficiencies of the traditional education of China. The paper has also pointed out the advantages and deficiencies of these activities organized in China. The activities bring more and more benefits to students' creativity improvement. For examples, two national competitions "Challenge Cup" and "College NOC" have been given as successful cases. At the same time, the extracurricular STI activities encounter several problems being closely relevant to the Chinese education history and realities, which are far from easy to resolve. At last, the paper has offered some suggestions for improving the STI activities in Chinese higher education. In a word, it is still a long and hard way to promote the creativity education in Chinese colleges.

References

- Boden, M. (2004). *The creative mind: Myths and mechanisms*. Routledge.
- Craft, A. (2001). "Little C' creativity". In A. Craft, B. Jeffrey, & L. Mu (Eds.), *Creativity in education*. Continuum International.
- Lubart, T. (2003). *Psychology of the creativity*. Collection "Cursus". Armand Colin.
- State Council of the People's Republic of China. (2010). *National education plan of education reform and development 2010-2020*. Beijing, China. (in Chinese)
- Chen, J. (2004). *Review of students' creative thinking and its development*. Press of Nanjing Commerce and Economic University.
- Dong, Y. (2003). *Students' scientific innovation activities*. Press of Sciences and Technology University of Hebei.
- Feng, Q. (2009). *Analysis of the system development of students' extra-curricular innovation activities*. Research of Higher Education.
- Su, Z. (2006). *Research in the innovativeness development mode which is based on the pattern of "Challenge Cup"*. Press of China Medicine University.