Cultivate Scientific Literacy of College Students in Optional Courses  
Fu-Yun LI\textsuperscript{1,a,*}, Tao MENG\textsuperscript{1,b}, Yue-Zu CAO\textsuperscript{1,c} 
\textsuperscript{1}Beijing Institute of Graphic Communication, China  
\textsuperscript{a}lifuyun@bigc.edu.cn, \textsuperscript{b}tmeng@bigc.edu.cn, \textsuperscript{c}caoyuezu@bigc.edu.cn  
*Corresponding author 

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Abstract: Utilize optional courses to modularize the scientific knowledge, and adopt various forms of teaching activities: such as watching the related videos, discussion between teachers and students and a variety of practical activities of college students so as to deepen college students' cognition to scientific knowledge, scientific method, scientific attitude, scientific spirit, science & technology and society and other aspects, thus enhancing the sense of social responsibility and improving students' scientific literacy.

The level of scientific literacy of the public is the foundation of a nation's sustainable development. Reviewing the history of science, every major scientific discovery plays a very profound effect on the world view of humans and the development of society, and thus causes the thinking and understanding of the relationship between human and nature, between human and society, and between different persons. In the 21st century, as for the successful development that the society and the individual want, the scientific literacy of all the people and individuals is of vital importance. According to the unified deployment of the State Council and approved by the National Bureau of Statistics, China Association for Science and Technology conducted the investigation on the scientific quality of Chinese citizens from March to August, 2015. The scope of this investigation covers 31 provinces, autonomous regions and municipalities directly under the central government in mainland China. On September 19, 2015, China Association for Science and Technology published the results of the ninth investigation on the scientific quality of Chinese citizens: In 2015, the ratio of citizens with scientific quality in China reached 6.20%. According to the investigation, the levels of scientific quality of the young and middle-aged groups are higher, and the levels of scientific quality of the citizens aged 18 to 29 and 30 to 39 reached 11.59% and 7.16% respectively; most of the public use television, Internet and mobile Internet to obtain science & technology information [1]. The College students are a special social group. Improving the scientific literacy of college students has a direct relationship with the full implementation of the strategy of developing the country through science and education and the strategy of reinvigorating China through human resource development and the improvement of the competitiveness of comprehensive national strength. The course of Physics and Human Civilization established in our university is an optional course of scientific common sense education oriented to all the students. Through the exploration of the course content, teaching activities and others of this course, strengthen the students' scientific literacy.

Modular Teaching Content 
Physics and Human Civilization is the public optional course of the whole school. In order to strengthen students' cognition of science and technology, we start out in the perspective of historical development, and adopt modular teaching, including the teaching discussions of five modules, i.e. "ancient civilization of science & technology"; "exploration of the universe"; "development of science & technology in modern and contemporary times"; "new material and new energy"; "relevant discussion about radiation", and the discussion on the relationship between science & technology and human society runs through these four modules. The contents of the five modules are introduced briefly below.
Module I: Ancient Civilization of Science & Technology
It introduces the ancient science & technology and its thoughts of the East and West, especially the history of science and technology, scientists and scientific thoughts of countries such as China, Greece and Arab.

Module II: Exploration of the Universe
Taking time as the main line, it introduces all kinds of outlooks of universe of humans formed in the exploration of the universe structure from ancient to modern times and the influence of religion on the human cognition to the outlook of universe. It introduces the theoretical basis of contemporary outlook of universe (general theory of relativity, etc.), the black hole, dark matter and time travel; including new discoveries of exploration of the universe.

Module III: Development of Science & Technology in Modern and Contemporary Times
It introduces the development and improvement of the scientific theory (mainly classical physics, modern physics) in contemporary and modern times, the generated first, second and third industrial revolutions with the development of science and the demand of society and the influence of social system on the development of science & technology.

Module IV: New Material and New Energy
As college students, it's the responsibility of a social man to pay attention to the national conditions and needs, the national priority research areas of science & technology, major key technologies and the overall improvement of the supporting ability of science & technology. According to the National Guideline on Medium and Long-term Program for Science and Technology Development (2006-2020) published by the State Council of the People's Republic of China on February 9, 2006, the guideline proposed 11 priority research areas, i.e. energy, water and mineral resources, environment, agriculture, manufacturing industry, transportation industry, information industry and modern service industry, population and health, urbanization and city development, public security, and national defense\(^2\). Due to the limit of course hours, we will take new materials (especially nanotechnology) and new energy (fusion energy, solar power) as the special discussion topics of new material and new energy module.

Module V: Relevant Discussion about Radiation
Radiation is closely related to the public. The course will introduce the generation and variety of radiation, its benefits for human, and how to prevent the occurrence of harm. Students' understanding of the knowledge will help in holding a scientific attitude to radiation in daily life.

Some Teaching Strategies to Improve Students' Scientific Literacy
Making Full Use of the Resources of Internet and Mobile Internet
According to the ninth investigation on the scientific quality of Chinese citizens by China Association for Science and Technology, most of the public use television, Internet and mobile Internet to obtain science & technology information. The Internet and mobile Internet have become indispensable teaching methods. In order to further develop students' horizons and knowledge and deepen the cognition to the science & technology, in addition to the special topics for discussion in the class, the course also introduces some websites related to science & technology to the students such as

(1) Netease public class
The students can watch the courses online for free given by the professors from the world famous universities such as Harvard University, Oxford University and Yale University with the contents of fields such as science & technology, humanity, society, art and finance, many courses of which have Chinese captions. For example, in teaching the special topic of exploration of the universe, it introduces students to watch the public class Exploring Black Holes of the Massachusetts Institute
of Technology; Cassiopeia Project: Bang to Man; Open Yale course: Frontiers and Controversies in Astrophysics. These videos have greatly broadened the vision of the students who love astronomical knowledge.

(2) Websites of the ancient civilization of science & technology of China: http://www.ancienttech.cn/
The website is rich in content with a total number of more than 200 thousand characters, over 1,500 images and above 100 video animations. Rich contents and diverse display forms make more people know about and approach the ancient science & technology of China, always remember the footprint of every step of human science & technology progress, and jointly inherit the heritage of human civilization.

(3) Availing of the QQ groups to share resources
At any time, students can share some related resources of group documents uploaded in QQ groups established; simultaneously, through these QQ groups, the mutual learning and interaction between teachers and students and among students could be enhanced.

**Team Collaboration to Discuss Special Topics**
The cooperation is the foundation of work, adapting to the society and even the competition of national strength in the future. In the process of course study, the teacher will first request the students to voluntarily form several teams of 4-5 persons, and each team carries out the team discussion on special topics chosen by team members or specified by the teacher. The team members cooperate to prepare PPT, and the representative of team introduces the research results of the team to the whole class. Through this way, resource sharing could be realized with a good teaching effect. When discussing about the radiation problems, some teams even specially went to some public places to conduct field investigation. Through survey and interview with the public, they prepared videos of the investigation process and results. In the process of completing the whole task, the sense of social responsibility of the students was enhanced, the friendship was formed among classmates, and the exchange of learning was strengthened among students of different majors in acquiring knowledge and various skills.

**Visiting the Physics Demonstration Laboratory**
The physics demonstration experiments provide the students with necessary perceptual knowledge for learning physical knowledge and play a very important role in improving the interest in learning, deepening the understanding of basic concepts, basic knowledge and theorems, enlightening students' thinking and expanding the students' horizons [3]. The demonstration experiment is also effective in cultivating the scientific literacy of students such as abilities of observation, experiment, logical thinking and cooperation. Both the students of science and arts can deepen their understanding of physical world and improve their scientific literacy through the magic physical demonstration phenomenon.

**Conclusion**
Launching the comprehensive courses of science education can make up the lack of scientific literacy of students. The course of Physics and Human Civilization is a public optional course of our university established for students of various majors, which has broadened the vision of students with the constant exploration of the teaching process and the integration of teaching contents, and with the help of a variety of teaching resources. Team collaboration in special topic discussion is conducive to learning scientific knowledge, facilitating to grasp scientific thought and scientific spirit, and enhancing students' good quality of solidarity, cooperation and courage of exploration.
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[1] The Results of the Ninth Investigation on the Scientific Quality of Chinese Citizens by China Association for Science and Technology is Released, Pan Xi, September 21, 2015, News from ScienceNet.cn
