

Fujun Ren · Jiequan Zhai

# Communication and Popularization of Science and Technology in China

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# Preface

The twentieth century saw great achievements occur in nearly every important aspect of human life. That century witnessed unprecedented economic prosperity, industrialization, the dawn of the information age, and the emergence of the knowledge-based economy. All of these developments can be attributed to scientific and technological advances in a variety of fields. These innovations have been widely applied, resulting in profound changes in the mode of economic production, economic development, lifestyle, in social values and individual psychology.

Due to scientific developments through the twentieth century, human society entered into a new era of technological sophistication, more rational economic structures, and general improvements in well-being. The changes brought by science in the twentieth century give us confidence that scientific advances in the twenty-first century will continue to provide impetus for social development. Advances in basic scientific research will expand our understanding of nature and society, as well as promote technological and economic development; information science and technology will accelerate the communication and application of knowledge, improve industrial technology, and enhance economic prosperity; advances in biology will improve people's health and quality of life; new energy technologies will solve the world's energy and environmental problems; nanotechnology will lead to a new technological revolution. In sum, advances in science and technology will change nearly every aspect of our lives.

At present, economic growth is driven by innovations in science and technology, which appear to be decisive factors in economic development and social progress. Scientific and technological innovations are an increasingly important means for solving social problems and for stimulating economic growth. As a consequence, intellectual resources are becoming more strategically important for national development. Increasing national wealth and improving people's quality of life increasingly depend on the innovation and application of knowledge. The speed at which knowledge is created, as well as the communication, diffusion, and application of scientific breakthroughs have become increasingly important for national and global prosperity. On the international stage, science and technology have

become an increasing battleground in the constant competition between nations. That's why all countries, especially developed countries, have made scientific and technological innovation and promotion key to their national strategies.

As links between science and technology and the economy have become tighter, scientific, technological and intellectual innovations have also grown in the importance they hold for social development. While the importance of promoting public literacy has long been known, only in the twentieth century did efforts to promote scientific and technological literacy become a major priority. As early as the 1970s, the United States carried out an extensive investigation of citizens' scientific literacy, which gave birth to a plan called the '2061 Project' in the 1980s. The 2061 project aimed to improve the scientific literacy of all Americans. In the 1990s it was adopted as a national goal in the US to 'help all Americans become literate in science, mathematics, and technology'. Similarly in Europe, a movement named the 'public understanding of science' was born in the mid-1980s. This view held that scientific literacy was necessary to be a modern citizen, and emphasized promoting public understanding of science through joint efforts across different sectors of society. As these policy initiatives show, Western governments have long viewed civic scientific literacy and understanding of science as high priorities.

The basic ways to improve civic scientific literacy are through science education and popular media. In China, both more extensive developments of school science curricula as well as an increase in the use of modern media to promote and disseminate scientific knowledge is needed. In recent years, developed countries have made the promotion of scientific literacy and science education key components of their strategies to increase scientific and technological innovation. The value of efforts to promote public awareness of science is not limited to the promotion of citizens' scientific literacy, but is also evident in the enhancement to scientific and technological research. These efforts also are important for economic development. As President Hu Jintao noted in his speech celebrating the 50th anniversary of the China Association for Science and Technology (CAST), science consists of both innovation and popularization, since these processes that complement each other. Building a country driven by innovation will require improvements in citizens' scientific literacy and greater public awareness of science. The promotion of science and scientific literacy are the basic conditions for nurturing talent and innovation.

Globally, the promotion and dissemination of scientific ideas increased greatly in the twentieth century due to social change, public demand, and growth in communications technology. In recent years there have been innovations in the methods used to promote scientific understanding. Large-scale efforts to promote science and scientific literacy have been undertaken jointly by governments, schools, mass media, industry, the scientific community, and organizations dedicated to promoting scientific awareness. These efforts have involved a variety of actors, complex networks, and means of communication. In summary, these efforts represent a new and exciting phase in the promotion of science and technology.

In China, efforts to promote public awareness of science have long been a government priority. The phrase 'popularize scientific and technological knowledge' can be found in the first edition of the Constitution of the People's Republic



of China early in 1954. Since then, the government has made efforts to promote scientific and technological literacy a major priority. This has held particularly true since the 1990s, when the Central Committee of the Communist Party of China and the State Council issued the *Directive Opinions on Strengthening Engagement in Science and Technology Popularization*, the *Law of the People's Republic of China on Popularization of Science and Technology* (*Law of Science Popularization* for short), and *The Outline of the National Scheme for Scientific Literacy (2006–2010–2020)* (the *Scheme* for short). These laws have increased resources for promoting scientific literacy and have led to policies that have made these efforts more effective. These developments suggest that the promotion of public awareness of science and technology will be increasingly successful.

However, despite reasons for optimism about the future, science and technology communication and popularization in China still face many challenges. Although there have been theoretical advances in this field, in addition to increased funding and technological advances, there remain organizational and methodological hurdles to increasing public awareness and understanding of science and technology. In response to these challenges, new efforts to increase scientific and technological literacy have emerged based on the principle of “government promotion and participation by societal forces.” Today the key objectives for the promotion of scientific literacy in China are (1) draw lessons from the experiences of developed countries, (2) adapt to modern times, (3) be in accordance with Chinese conditions, and (4) accelerate innovation.

Theoretical and practical research on science and technology communication and popularization in China has become particularly dynamic over the last 10 years, driven by the demands of scientific, technological, and economic development, together with the rapid development of organizations promoting public awareness of science. This research has led to new concepts, answered important questions, and discovered new problems. Important theoretical advances in this field have informed government policies on the promotion of science. Future research on science and technology communication and popularization in China will be enhanced by greater integration of research with advanced international theories and methods, and by an increased focus on the unique problems and challenges of promoting public awareness of science in China. Combining cutting-edge, international methods and theories with a deeper understanding of the unique context of modern China will allow researchers to develop better techniques to enhance public awareness of science and technology.

Promoting public understanding of science can only be successful if those involved are themselves guided by scientific theory and research. Similarly, policies aimed at promoting scientific literacy will only be successful if they themselves are guided by science. It is also worth noting that the best ways of educating the public about science will depend on the characteristics of the audience at which they are aimed. In order to meet the challenge of making all citizens scientifically literate, a great deal of research will be needed.

This book aims to be a reference for researchers studying the promotion of scientific literacy in China, as well as a guide for those interested in promoting

scientific awareness generally. This book covers advances in science and technology communication and popularization (STCP) practice and research in China and abroad. Theoretical issues are discussed, and important problems in efforts to promote scientific and technological awareness are identified (e.g., basic principles, structures, channels of communication, and present needs). This book provides a summary of the progress of STCP in China in recent years (especially after the issuing of the “National Scientific Literacy Outline”) including, STCP resource and capacity construction, science popularization policies, practitioner development, infrastructure construction, and the development of the science popularization industry. At the same time, this book also reviews the design, organization, monitoring, and evaluation of science and technology communication and popularization programs. In addition, it highlights current trends and developments in STCP in China, and calls for a greater focus to be put into research for the promotion of scientific literacy.

It is hoped that this book will be useful to readers both in China and abroad by familiarizing them with the history, theory, and development of STCP. Chapter 1 briefly reviews the history of STCP. Chapters 2, 3, 4, and 5 discuss the conceptual framework, basic structure, methods of communication, and current needs of STCP. Chapter 6 introduces the principle content of programs aimed at improving Chinese citizens’ scientific literacy, while Chaps. 7 and 8 analyze resources, capacities and conditions that have been developed for STCP in China. Chapter 9 investigates the organization, monitoring, and evaluation of science popularization practices, and finally Chap. 10 summarizes important topics and trends in STCP in the China of today.

It should be noted that in this book, the phrase “science and technology communication and popularization,” or STCP, is used as a term to define the entire field. The reason for this choice is that, in the authors’ opinion, at the present stage the field involves problems and tasks at different levels. STCP is an inclusive and integrated term that better reflects the current challenges of scientific, technological, and social development. This term better encompasses the field of study as well as the practice of promoting public awareness of science and scientific literacy. It is our view that this term is more useful than previous ones for the discussion of different problems concerning science popularization, public understanding of science, and scientific communication. The term “science popularization” is also used in the book as shorthand for “science and technology communication and popularization”, but its meaning is not limited to the popularization of practical scientific and technological knowledge (as opposed to an understanding of the scientific method and a scientific worldview). For these reasons, we feel that this updated terminology is more useful than traditional definitions of science popularization.

STCP is a practical and rapidly developing field. Important changes have occurred in the theory and practice of STCP in recent years. The views presented in this book and the predictions for the future of STCP may need to be revised based on future developments. Given the scope of the topic and limitations of space, there

will be aspects of STCP that this book, like any review of the field, is bound to overlook. Despite attempting to represent a wide variety of viewpoints, it is beyond the scope of the present work to include all relevant lines of thought. We welcome commentary and criticism, and we hope that this book can be a platform to further both lively debate and close cooperation among those studying and implementing STCP in today's China.

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# Abstract

This work is a theoretical exploration and a practical summary of science and technology communication and popularization (STCP) in China. Basic concepts and theory in STCP are elaborated upon. Further, the history of STCP, as well as its recent development, is described in terms of the design, organization, monitoring and evaluation of science popularization programs. The book covers the training given to educators and the methods used to promote scientific literacy. New trends in the field are analyzed, current challenges are identified, and proposals for future research programs are described. This book can serve as a reference not only for managers, practitioners, and researchers in the field of STCP, but also for those pursuing careers in science and technology, S&T-related management, science journalism, mass media, industries involved in creating S&T infrastructure, and for teachers and students of science. This book is appropriate as a reference work for undergraduates and postgraduates majoring in the fields of STCP, education, philosophy of science and technology, and science journalism among others. It can also be useful for training purposes among science popularization practitioners.



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