Working together to address global issues: Science and technology and sustainable development

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Nowadays, the human community is facing many global challenges, such as food safety, water pollution, and climate change. People have realized the importance of sustainable development. To tackle these global issues and to achieve the Sustainable Development Goals (SDGs) stated in the United Nations 2030 Agenda, joint efforts among countries around the world are necessary. All sides need to actively participate in global governance and contribute to the provision of public good in the international community. Science and technology is a field that deserves much more international cooperation. Scientific and technological innovation is the major driving force for social and economic development, especially for sustainable and green growth. This has been highlighted by China’s President Xi Jinping on many occasions. He has noted that we should pursue innovation-oriented development, go green and pursue international cooperation in science and technology and building a strong talent pool.

Recognizing the close relationship between science and technology and sustainable development, we have produced a special issue to explore the roles of public scientific literacy, science education and scientific research in achieving sustainable development.

Advances in science and technology are inevitably accompanied by some social problems. Thus, a high level of scientific literacy among the public, including public engagement in and understanding of science, is important for the sustainable development of society.

Daya Reddy, president of the International Science Council, emphasizes the urgent need to enhance public scientific literacy in his article ‘Scientific literacy, public engagement and responsibility in science’. First, students and the general public should be educated in a science-based way. The enhancement of the scientific literacy of the public can help prevent the rampant spread of false information and facilitate the application of scientific results. With public engagement in science, scientists’ endeavours to achieve sustainable development can be more worthwhile and rewarding. Second, scientific knowledge and outcomes should be made accessible to policymakers, as they are the people who can make the most use of those scientific outputs. Without their support and dissemination, scientific progress cannot bring about large-scale benefits. To maximize the advantages brought by scientific development and reduce problems caused by the ignorance or misunderstanding of the public, scientific knowledge should not be limited to the scientific community; rather, it should be made accessible in a broader way, including for the general public, policymakers, students and future scientists.

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An effective way to address global issues is to equip students – the major driving force for future social development – with the knowledge and ability to tackle those problems. This means that, in the face of global challenges, science education has a distinctive role to play, which is illustrated in articles written by Robert A Kolvoord and Aurelio P Vilbar.

Kolvoord relates the United Nations SDGs to primary and secondary education in his article ‘Fostering spatial thinking skills for future citizens to support sustainable development’. He notes that traditional, discipline-focused thinking might fail to achieve the SDGs, which are cross-cutting in nature. To solve this problem, we need innovation and disruption in primary and secondary school systems, which feature a monodisciplinary set of knowledge and tools, and we should equip students – the next generation of leaders and decision-makers – with the skills of geospatial thinking and reasoning. Kolvoord examines a particular educational programme for secondary students – the Geospatial Semester, which is intended to help students access and share data that bears on the SDGs and to enhance their abilities to cope with problems relating to the SDGs. The Geospatial Semester proves to be effective in improving students’ spatial thinking skills and promoting a focus on the SDGs through the extensive application of geographic information systems in education. Therefore, he highlights the need to help the educational establishment to embrace such geospatial tools and the SDGs.

Vilbar also focuses on science education for sustainable development in his article ‘Children as courseware collaborators: Using participatory research to produce courseware integrating science and sustainable development’. He notes that children – who will eventually be responsible for achieving sustainable development and who are the end users of the ESD (education for sustainable development) curriculum – are not actively involved in educational material development. Thus, in this research, Vilbar examines how teachers can collaborate with children to produce teacher-made courseware by virtue of participatory action research within the context of second-language teaching. He suggests that language curriculum and instructional material developers should develop contextualized digital materials in an interdisciplinary and customized way; this new way of producing courseware with students’ participation can promote the learners’ interest in science and ESD concepts.

Besides public engagement in science and science education, scientific research is obviously an indispensable part in our endeavour to achieve sustainable development. Science and technology plays a key role in dealing with global change and predicting and solving problems in case of emergencies such as natural disasters.

Fang Chen et al. discuss the contribution of science and technology to disaster risk reduction (DRR) in their article ‘Building scientific capacity in disaster risk reduction for sustainable development’. DRR is crucial to the achievement of the SDGs in that the frequency and intensity of disasters increase as climate change intensifies and environmental degradation worsens. In the face of natural disasters, we need to focus on prediction and prevention, as well as response and recovery. To enhance our ability to cope with disasters, we have to thoroughly grasp the risks before making decisions and drafting policies. However, as Chen et al. note, the problem is that we lack such an overall grasp. Many countries and regions currently do not have easy access to relevant data, and traditional data sources prove to be inadequate for crafting effective and efficient responses and recovery options, let alone early preparation. To narrow the data gap, traditional data sources must be integrated with alternative and emerging data sources. Digital technologies, such as cloud computing, and infrastructure, including research programmes such as CASEarth, can provide valuable resources for multisource data integration, contributing to the development of information-driven policy and decision-support systems for DRR. Scientific researchers and policymakers should apply emerging technologies and data science methodologies to develop innovative solutions to global challenges and devise strategies for sustainable development, both within and beyond China.

The scientific community makes a tremendous contribution to the development of science and technology, but many scientists and their achievements remain unknown to the public. Thus, telling
the scientific stories of the older generation may contribute to the public understanding of science and enhance people’s respect for scientists.

Jianhua Lu, in his article ‘On the role of global change science in sustainable development: Reflecting on Ye Duzheng’s contributions’, revisits the story of Ye Duzheng, a trailblazer of global change science in China. He reviews Ye’s contribution to climate research and global change science in China and across the world. As a pioneer, Ye linked global change science to sustainable development, and his understanding and interpretation of orderly human activities merits more attention. Ye also stressed that public literacy in global change science and the interaction and cooperation among all kinds of science and all walks of life are essential to sustainable development. Ye’s ideas have a lot in common with what scientists of the current generation are advocating. Reviewing the work of older scientists such as Ye Duzheng highlights the significance of their work and offers models for young scientists in their pursuit of scientific careers; moreover, it raises public respect for scientists and their contributions.

The realization of the SDGs requires joint efforts among scientists, educators, policymakers and the public. Science and technology, as a global public good, can directly or indirectly contribute to sustainable development. In an era of continuously emerging digital technologies, everything, including the solutions to global challenges, seems to be information driven. The cultivation of the next generation of scientists who shoulder the responsibility of sustainable development requires science-based and information-driven pedagogy. Disaster response and control, which are closely related to the SDGs, need information-based decision-making. In a word, to address global issues, all stakeholders should be equipped with a global vision and a science-based and information-driven pattern of thinking. The achievement of the SDGs requires international cooperation in science and technology, as well as collaboration among all walks of life and joint efforts within and beyond the scientific community.

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