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Global Perspectives of Nanotechnology Education

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Abstract

The continued advancement of research and applications described in this book depends on the quality of the next generation of scientists and engineers who will lead the nanotechnology revolution. The growth of nanotechnology education then describes the successful efforts of educators on six continents in developing the nanotechnology talents of their students. Examples of educational programs at the primary, secondary, undergraduate, and graduate levels, for teacher training, vocational education training, and for informal education of the general public are each presented.

Keywords: Nanotechnology; Education; STEM

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Introduction

Education and training are essential to produce a new generation of scientists, engineers, and skilled workers necessary for rapid progress in nanotechnology around the world. Nanotechnology education should be available to all people, not just future experts in this field [1]. Politicians, policy makers, and voters need foundational knowledge in science, technology, engineering, and math (STEM) subjects because they make decisions that affect the growth of science and engineering, even though they do not study these technical fields. A trained nanotechnology workforce and a Nano literate citizenry can be developed through both formal and informal education efforts, starting with the foundations in children and increasing in technical and specialized education through the university levels. Achieving these results requires teachers and education researchers to design curricula and programs that demonstrate the interdisciplinary nature of nanotechnology, including disciplines outside of the usual STEM fields [2].

Discussion

With the decreasing number of people in western countries choosing to study science and engineering and with the rapid progress being made in nanotechnology, the problem of a trained workforce is expected to be acute. Nanotechnology education should begin by covering the broad science topics in order to facilitate new approaches to problems and new solutions based on a broader understanding of foundational science [3]. However, business and entrepreneurial skills also are needed to transfer scientific knowledge into products, which increases the economic impact, importance, and continued support for scientific education. Therefore, it is essential that scientists and engineers no longer confine themselves strictly to the laboratory; broad and fundamental understanding of business, society, politics, and health and safety are required. To that end, it is also imperative that scientists and engineers prepare to work in a global environment, solve global problems, and address the implications of their work on a global scale. They must therefore collaborate with relevant experts to address the societal, ethical, political, and health and safety implications of their work for global humanity. Nanotechnology education should have as one focus a broad, interdisciplinary approach to science and engineering at the nanoscale [4].

Conclusion

To increase the pool of students interested in advanced education in science and technology, educators should convey STEM subjects as an exciting and creative endeavor from their first introduction. Innovative foundational education in schools and informal instruction opportunities can help to accomplish this goal. There has been a global push for better STEM education, particularly in the K-12 arena. The goal is to increase the number of people interested in pursuing advanced education in STEM fields, and to ensure sufficiently educated workers for STEM jobs. This has resulted in a generation of workers with content knowledge and enthusiasm, but many with limited ability to apply that knowledge to real-world scenarios and problems, and limited experience with thinking critically and creatively.

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