Chapter 1
From STEM to STEAM: The Evolution and Its Global Implications

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ABSTRACT

This chapter discusses the shift from STEM to STEAM, which integrates the arts into technical education to stimulate creativity, critical thinking, and innovation. STEM education prioritized technical skills to assure global competitiveness in the 20th century. Interdisciplinary approaches became necessary as global issues like climate change and public health became increasingly complex. STEAM promotes creative problem-solving, empathy, and design thinking through the arts. This chapter discusses how STEAM improves STEM by combining technical expertise with creativity to educate students about real-world problems. It shows STEAM's global adoption and ability to stimulate innovation and solve social issues, preparing a workforce with technical and artistic skills for a fast-changing world.

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INTRODUCTION

The Origins of STEM Education

STEM education—Science, Technology, Engineering, and Mathematics—became a unique educational focus in the late 20th century due to the growing need for a highly qualified workforce in technological and scientific sectors (Meyer & Norman, 2020) (Jesionkowska et al., 2020). It began after World War II when science and technology innovation was essential to national security and economic growth. After the Soviet Union launched Sputnik in 1957, science and technology education became increasingly competitive, leading to large investments in these subjects, particularly in the US (Gibson, 2020).

By the 1980s and 1990s, STEM became a major aspect of educational strategies and programs in many nations to educate students about 21st-century technology concerns (Drake & Reid, 2020). The emergence of information technology, the internet, and globalization reinforced the demand for a scientific and technology-savvy citizenry. Governments and institutions worldwide recognized these disciplines as essential to economic competitiveness, innovation, and the growth of aerospace, engineering, biotechnology, and computers.

Concerns over the "STEM gap," a widening divide between STEM employment and qualified candidates, boosted STEM's rise. Industrial automation and new technology increased the requirement for technical and critical-thinking people, highlighting this divide (Anaya et al., 2022) (Cavaletto & Berra, 2020). The solution was STEM education to address this gap and keep countries competitive in the global economy.

STEM's interdisciplinary approach to problem-solving, teamwork, and real-world applications makes it important in modern education. This method teaches students to innovate and critically analyze complicated situations as well as technical skills. Globally, STEM education promotes innovation, economic progress, and sustainable development in a technology environment.

The Transition to STEAM

A new perspective called for integrating the arts into STEM education as it gained popularity. STEM to STEAM includes "Arts" to create a more complete and creative education (Hughes et al., 2022) (Belbase et al., 2022). The arts promote