

Chapter 18

STEAM and Sustainability: Lessons From the Fourth Industrial Revolution

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ABSTRACT

The educational challenge of sustainability remains unexplored in the development of children in the K-12 curriculum in the United States and potentially in the educational curriculum of many of the member states of the United Nations. Using a case study method, this chapter shows how sustainability can be an educational value and a public good, transmitted to students through everyday instruction. By conducting a regional analysis in specific cultural groupings, using fieldwork and applied research methodology, students can demonstrate competence for sustainable education on a whole host of issues relevant for the Sustainable Development Goals (SDG 2030). With younger age groups consisting of students in middle and elementary school, the chapter examines an activity-based approach for socializing young children to issues of sustainability and preparing them for what is known as “the fourth industrial revolution.” Finally, it is imperative that corporations adopt a socially responsible approach towards investing that is environmentally conscious of long-term governance impact.

INTRODUCTION

When the UN (United Nations) announced the SDGs in 2015, mostly economists and diplomats or country representatives and ambassadors immediately grasped the importance of the goals for future generations. Most educators still struggle with how to make the direct connection between STEM edu-

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cational goals and the concepts entailed in the multilayered construct of sustainability. STEM focuses explicitly on Science, Technology, Engineering, and Math to introduce innovation in the educational system in mostly the Western countries that are facing post-industrial or post-manufacturing decline; while sustainability suggests that there is more to STEM than just tinkering with recent technology tools, social media, robots, and gadgets. STEM outlines the educational principles for a scientifically literate and technologically advanced society in the 21st century. Sustainability on the other hand suggests the scientific models of the previous centuries, fueling the growth of the industrial age and the spread of globalization -- with unlimited horizons for labor and markets -- have been falling short for most of the populations around the world. Can these two visions, one of STEAM education and the other of sustainability, meet on a common ground or do they inherently clash? In this paper, we argue that the recent upsurge in the STEM and STEAM educational curriculum -- the added emphasis on Arts and Humanities is critical -- and the global emphasis on sustainability are the two faces of the same coin related to the post-industrial decline in the West and the failures of the neo-liberal vision of society, culture, and environment. For science education to fully embrace the challenges of the 21st century, STEAM would have to be integrated with sustainability. Likewise, the business and investor class would have to join with government and non-government sectors to transform our society.

The educational pathways to STEAM curriculum can also be confusing to children and parents if it is not fully clear what STEAM truly stands for. Like other science education programs, STEAM can stop short of its best manifestation without a full implementation. STEAM should be an integrated approach to learning; there must be intentional connections between standards, assessments, and lesson design. Multiple standards of assessment and experience can be used to foster learning in subjects focused on Science, Technology, Engineering, Math, and the Arts. Techniques and assessment can be conducted in and through different modes of inquiry, with an emphasis on process-based learning where students are allowed to work across disciplines. Process learning and “making” is at the heart of the STEAM approach. Thus, utilizing and leveraging the integrity of the arts, history, humanities, and culture is essential to an authentic STEAM initiative.

On the other hand, sustainable development has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development calls for concerted efforts towards building an inclusive, sustainable, and resilient future for the people and the planet. For sustainable development to be fully achieved, it is crucial to harmonize four core elements or the 4E's: Economic growth that is fair; Equality or social inclusion; Education or universal literacy; and Environmental protections against climate change. These elements are interconnected and all four are crucial for the well-being of individuals, societies, and our planet. As outlined by the UN goals, the 4E's are crucial for any society to advance into the 21st century: Economy, Equality, Education, and the Environment.

Eradicating poverty is related to economic development; this is another significant goal of the UN mission, originally part of the MDG (Millennium Development Goals) universal goals, in all its forms and dimensions is an indispensable requirement for sustainable development and significantly correlated with the 4E's mentioned above. To this end, there must be promotion of sustainable, inclusive, and equitable economic growth, creating greater opportunities for all, reducing inequalities, raising basic standards of living, fostering equitable social development, and promoting integrated and sustainable management of natural resources and ecosystems. How we handle these challenges will reshape our past and determine our future.

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