SDGs and STEM Education:  
An engineering student perspective 

By Ryota Yamaura (4th-year Undergraduate Student) 
and 
Hidenori Nakamura (Associate Professor) 
Faculty of Engineering 
Toyama Prefectural University, Japan 

Email: Ryota Yamaura: t814052@st.pu-toyama.ac.jp, 
Hidenori Nakamura: hdnakamu@pu-toyama.ac.jp 

Introduction 

In this issue of Perspectives on Earth and Space Science Educational Research, we present complementary perspectives from the student and researcher co-authors within one article. The original article in Japanese is provided on the AGU Education Section website, as well as this supporting version in English. We invite readers to learn words or phrases in either language by exploring both the Japanese and English versions of Volume 2, Issue 4 of the AGU Education Section’s PESSER series. 

Student perspective by Ryota Yamaura 

I have studied robotics engineering for three and a half years. I have also experienced various extra-curricular activities beyond technical natural sciences and human / social sciences. In particular, the United Nations Sustainable Development Goals (SDGs) have provided me with
many valuable opportunities and experiences during my days as a university student. This article summarizes my perspective and thoughts on science, technology, engineering and mathematics (STEM) education, the relationship between students and society, and how connections between these topics have impacted my university education through my engagement in activities focused on SDGs.

My concern on this topic began when I talked to a friend of mine about job hunting. Recently, many companies have shown some commitment to SDGs. We can easily find what they are doing to support SDGs through their web sites. For instance, Unilever Japan has promoted gender diversity in its own company through an action such as WAA (Work from Anywhere and Anytime) as a responsible business player in Japan, where gender balance (Goal 5) has been an issue. Since I had intentionally studied corporate actions for SDGs, I once asked if the friend knew about SDGs and how to find information about a company’s position on and possible support for SDGs. He did not know about SDGs; this conversation was the first time he heard the term. I asked the same questions of several other friends. Most of them either did not know about SDGs or only had heard the term without understanding what it was. Their unfamiliarity with SDGs concerned me, and I started to think more deeply about the relationship between SDGs and STEM education, in particular the impact of SDGs on STEM education.

Engagement in SDG activities requires a sense of ownership, understanding people’s motives in their daily lives, and being proactive. Difficult problems cannot be solved by only one person; solutions require collaboration. SDGs necessitate that we work together in collective ways and develop strong ties among us. This attitude is required to live and succeed in modern society. I would argue that here is an indispensable aspect of SDGs that goes beyond basic collaboration and relationships: that is, to share the value systems and world views among people in a designated social network. I felt the importance of sharing values at the initial stage of collaborative work for SDGs, when I worked with local partners to promote SDGs. Such activities included the development of an original board game that can be played by children and ordinary people, to help them learn what SDGs are and what they aim to do, with a sense
of fun. The game was developed in partnership with the local city government in a prefecture where the university is located, as well as in consultation with local citizens who provided local knowledge and context that is reflected in the game.

As for a sense of ownership as a core value of SDGs, I observed interesting uses of information and communication technology (ICT) in university education during the COVID-19 situation. Due to the pandemic, we have started to use ICT in various venues other than lectures. Every April in Japan, student associations and clubs recruit fresh students who just have entered the university. Last year (2020), face-to-face recruiting was banned; instead, we used online platforms to contact the first grade students via social network services (SNS) and YouTube. I was engaging in this type of online activity as a representative of a student
association that promotes student-led community engagement to solve local problems. During that time, I noticed that newcomers were voluntarily trying to connect with each other and to make friends, with some contacting one another on Twitter. I noticed a student who made efforts to make as many links to other students as possible. Another student identified the departments represented within the student groups, so that the connected students could gather department by department. The students who had not previously met spontaneously created connections among themselves, sharing what their interests and what they do with each other. I learned a significant lesson from them as a student and as a person, even though they are younger than I am. Similar things happened in distance learning. In one online class, I observed students helping each other: an experienced student helped another student to learn to use tools they did not understand at first, and students shared useful tips with others. Even if the students were not aware of SDGs, these student behaviors naturally modeled the fundamental values of SDG. The students’ efforts to connect in virtual ways and in cyberspace were impressive.

We rarely study SDGs in ordinary lectures in my university, particularly in specialized subjects such as STEM. Students who do not have an opportunity to learn SDGs during their liberal arts studies are likely to graduate university without studying SDGs. However, SDGs are no less important to an engineering student such as myself who must learn to think in line with SDGs meant to support modern and future societies. For instance, Goal 12 (“Ensure sustainable consumption and production patterns”) represents a mindset needed for an engineer to realize innovation. A vision for sustainable development and design of products that can be easily maintained and improved necessitates imagination. There is huge potential to create values from innovation, even in the daily aspects of our lives, which may help us achieve SDGs. University students of all fields and majors may contribute to innovation through education and learning core values, backgrounds, and details of the 17 SDGs.

When I attended job interviews, I noticed that many students did not know what the companies were doing for SDGs even though corporations were disseminating information about such actions in various ways. In fact, a company staff member told me they found
communication of their activities on SDGS with job-searching students to be challenging. This indicates a lack of common recognition between the information sender and the receiver. I initially thought that companies should improve the ways they produce and disseminate information, such as making content more attractive to students, through channels used by students. An additional observation is that current university students may not have serious interest in SDGs. Whatever the individual reasons are for the disconnection, common interest in SDGs provides many benefits once the connection is made. Generation gaps may be bridged, compassion is generated, and students may be motivated to be more responsible in their future professions. Thus, it is worthwhile for students of all types to learn SDGs.

As described above, it is evident SDGs have large impacts on STEM education at universities. As I reflect on my experience, I am reminded that SDGs play a significant role in shaping my future career. As I conclude my university years in the next few months, I would like to sharpen my knowledge of SDGs, as well as actions and trends related to SDGs. I hope that this article resonates with other students and readers, and I will be pleased if this is the case. I have found value in writing the article and reflecting on my experiences while doing so. I look forward to the future and even more new experiences after graduation.

Professor’s comments and perspective by Hidenori Nakamura

Eiichiro Harako argues that the fundamental task of contemporary environmental education is to rethink education that currently supports unsustainable societies and to reorient it (2021). Toward the end of rethinking education, he distinguishes the instrumental environmental education (“environmental education as patterns”) and ecological, relational, holistic and systemic environmental education as part of whole-system redesign (“environmental education as ground”), referring the discussions of S. Sterling and A.E.J. Wals. The double meaning scheme presented here may be used to analyze the effect of SDGs on STEM education.
In the above article, Yamaura stresses the transformative nature of SDGs actions. An engineer herself or himself shall be part of the transformation. This should be the case for STEM education too. Drawing upon the experiences of extra-curricular activities for SDGs with local stakeholders, he indicates the importance of a sense of ownership, collaborative attitude to develop effective partnerships, and sharing the vision at the initial state of partnership building in SDGs-oriented activities. Though STEM (education and careers) could be reoriented toward SDGs, this reorientation might still be based on instrumental world views, and it would not be transformative enough to be part of the holistic change of us as human beings. His focus on attitudes, visions and values of persons who study STEM, as well as of those who support STEM and SDGs education from outside of the university, goes beyond the limitation of such instrumentalism. As such, engineering students who pose questions on SDGs have strong potential to be driving actors and part of a transformative process, with regard to how we interpret STEM education and its meaning.

Acknowledgement

The authors appreciate Stacie Bender for her thorough English language editing to share the Japanese case with English-speaking people.

References


