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Round table sessions: "Lessons learned and best practices" and "Looking forward to the future"

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Nagaoka University of Technology (hereinafter designated as NUT) was originally established in 1976 with a clearly defined mission. NUT aimed to nurture and developed leading, practical engineers who have the potential to instigate innovation and drive technological advancements. Upholding the university's motto, the Spirit of Vitality, Originality, and Services (VOS), NUT continues to provide high-quality education in engineering.

A significant portion of NUT's student body comes from a strong academic foundation, primarily from KOSEN (College of Technology). Eighty percent of NUT's undergraduate students are transferred from KOSEN, starting in their third year, and engage in uniquely structured programs that blend undergraduate and master's level engineering education. This framework equips them with the extensive knowledge and skills necessary to excel in the engineering field.

NUT is acclaimed for its engineering education, which revolves around the "GIGAKU" philosophy, also referred to as the Science of Technology. The goal of GIGAKU is to nurture innovative talents who can rejuvenate and transform industries. This educational model emphasizes both fundamental academic insights and the cultivation of practical abilities in the field.

NUT's distinctive approach to engineering education consistently produces not only field experts but also proficient researchers, innovators, and practitioners. Furthermore, these individuals grow into individuals of high integrity and develop the capability to apply their technical knowledge through collaborations between academia and industry.

In 2017, NUT made a crucial advancement by integrating the concept of Sustainable Development Goals (SDGs) into its educational frameworks. This initiative led to the creation of the "GIGAKU SDG Institute," a new program that marks a significant progression from traditional engineering education, with a clear focus on contributing to global goals and enhancing societal well-being. Recognized by the UNESCO Chair Program, the GIGAKU SDG Institute champions the development of a practical engineering education system centered on creativity and dedication to achieving the SDGs through collaboration between industry and academia, and

international partnerships. Together with our allied universities, which uphold similar educational values, we successfully applied to the UNITWIN program and were granted permission to establish a UNITWIN Network (GIGAKU SDG Network) in 2023.

The purpose of the GIGAKU SDG Network is to act as a platform for the ongoing enhancement and evolution of engineering education practices aimed at aiding global efforts to meet the SDGs. The network includes ten institutions across six countries and one observer company in one county: India, Japan, Mexico, Mongolia, Spain, Viet Nam, and Thailand, all adhering to the network's four fundamental credos. These institutions foster an environment that nurtures innovative engineers equipped with practical skills aligned with the sustainable development needs of their respective countries. The collaborative activities primarily involve coordinated research projects, organization of joint conferences, exchange programs for students, faculty, and staff, and various outreach initiatives.

The four credos of the network - "work-integrated learning," "early start and recurring learning opportunities," "SDGs," and "industry and society evaluation" - are crucial in providing an engineering education that prepares engineers to respond to societal changes, diverse and complex challenges, and leadership demands quickly and flexibly in new industry sectors.

The objectives of the GIGAKU SDG Network are outlined as follows:

1)To develop education systems to foster creative, capable, and responsible engineers
2)To strengthen science, technology, and innovation systems of the cross-continent by creating close collaboration among education sectors and industry
3)To build a model of engineering education and to disseminate good practices to participating countries
4)To contribute to the achievement of SDGs

The GIGAKU SDG Network established four core values or credos essential for engineering education:

Credo 1: Work-integrated learning
Credo 2: Early start, and recurring learning opportunity
Credo 3: Sustainable Development Goals
Credo 4: Evaluation by industry and the society

These credos are designed to prepare engineers to effectively address societal changes, diversity, complex challenges, and leadership in new industrial sectors.
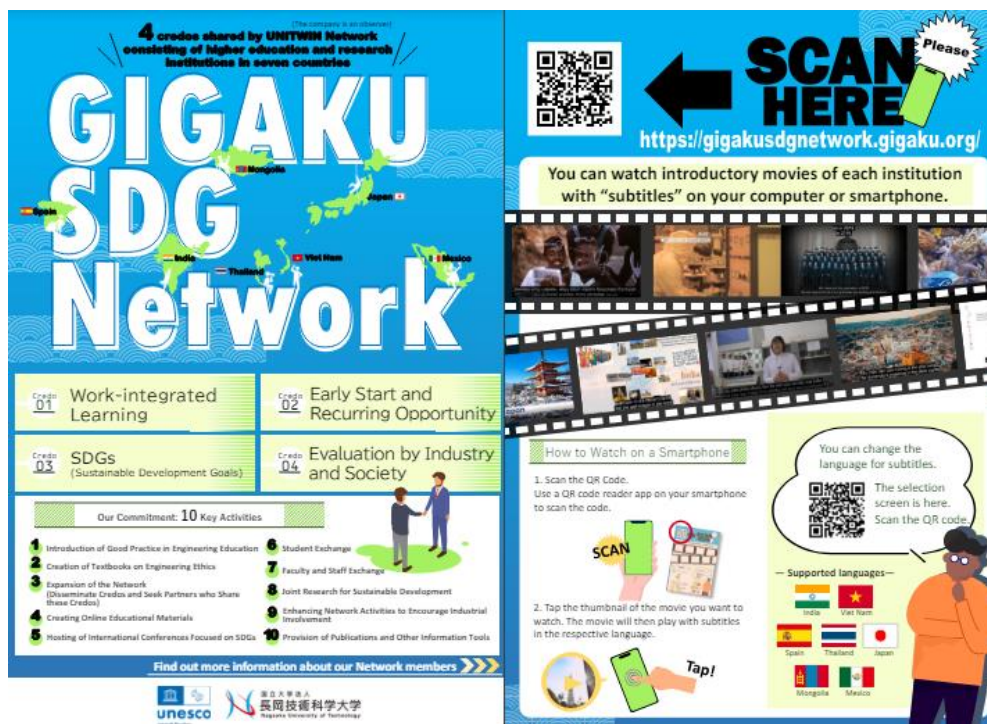
The Network fosters industry involvement through joint R&D projects, industry-sponsored scholarships, and internships, enhancing industry-academia collaboration towards SDGs. Notably, NUT has established GIGAKU Techno Park (GTP) Offices in founding member countries to facilitate this collaboration, with coordinators experienced in academia-industry partnerships. The locations of these GTP Offices are shown below. Each office has a coordinator, and coordinators from the core member countries of the GIGAKU SDG Network are preparing flyers in their own languages and conducting roadshows at secondary and higher education institutions to promote and raise awareness about online educational materials.

The network aims to enhance societal impact through several strategic initiatives. It plans to develop an open innovation campus to engage with various industrial sectors focused on research and development and self-sustaining. Furthermore, it commits to the dissemination of best practices in engineering education, which will be shared publicly through platforms such as UNESCO publications and social networks, particularly targeting developing countries.

This network is a solid foundation for promoting international collaboration in engineering education for sustainable development. Through the participation of renowned engineering education institutions and observer companies practicing Co-op education in each country, we are improving engineering education through common goals and cooperative efforts, and will continue to contribute to the realization of a world where no one is left behind, as set forth in the SDGs.

<Reference1: Online material>

https://gigakusdgnetwork.gigaku.org/

<Reference2: Meaning of GIGAKU>

GIGAKU (Science of Technology) is a scientific discipline focused on technology, enabling the refinement and advancement of technological systems and scientific methodologies by understanding the varied technical processes and topics inherent in contemporary life. With a comprehensive grasp of management, safety, information, and life sciences, rooted in physical sciences and engineering, GIGAKU develops practical technologies with a vision for future innovations. The term "GIGAKU" was first introduced by the founding president of NUT. It is derived from two Japanese roots: "GI [技], " which denotes all forms of arts, engineering, and technical activities, and "GAKU [学], " which refers to academic disciplines when used as a suffix, as seen in terms such as SU-GAKU (mathematics), KA-GAKU (chemistry), I-GAKU (medicine), KEIZAI-GAKU (economics). In essence, GI-GAKU represents the academic discipline for engineers.

GIGAKU SDG Institute