

SDGS IN ENGINEERING AND TECHNOLOGY: A QUICK GUIDE FOR EDUCATORS

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Abstract: Sustainable development is the responsibility of all, especially for the present generation who would be keeping Earth 'battered but intact and adequate' for the future inheritors. This is befitting the definition of sustainable development itself, which is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Nonetheless, actions would be unholistic, incomplete or misguided without knowledge. Hence it is important that everyone is aware of the fact that every façade of life on Earth is related to sustainability and our continued existence. This is clearly encapsulated in the 17 Sustainable Development Goals (SDGs) introduced in year 2015.

Education, is the key here.

This is a concise book written as a quick read by teachers, students or anyone at all who wants to know about SDGs and how each Goal is closely related to the engineering and technology advancement of today. Teachers will find the final chapter on incorporation of the concept in everyday learning of students a quick reference, with simple case studies, examples, tips and tricks to impart knowledge and understanding.

If it does not inspire, let it be at least informative, and a nudge to grow the 'sustainable minds' of the young.

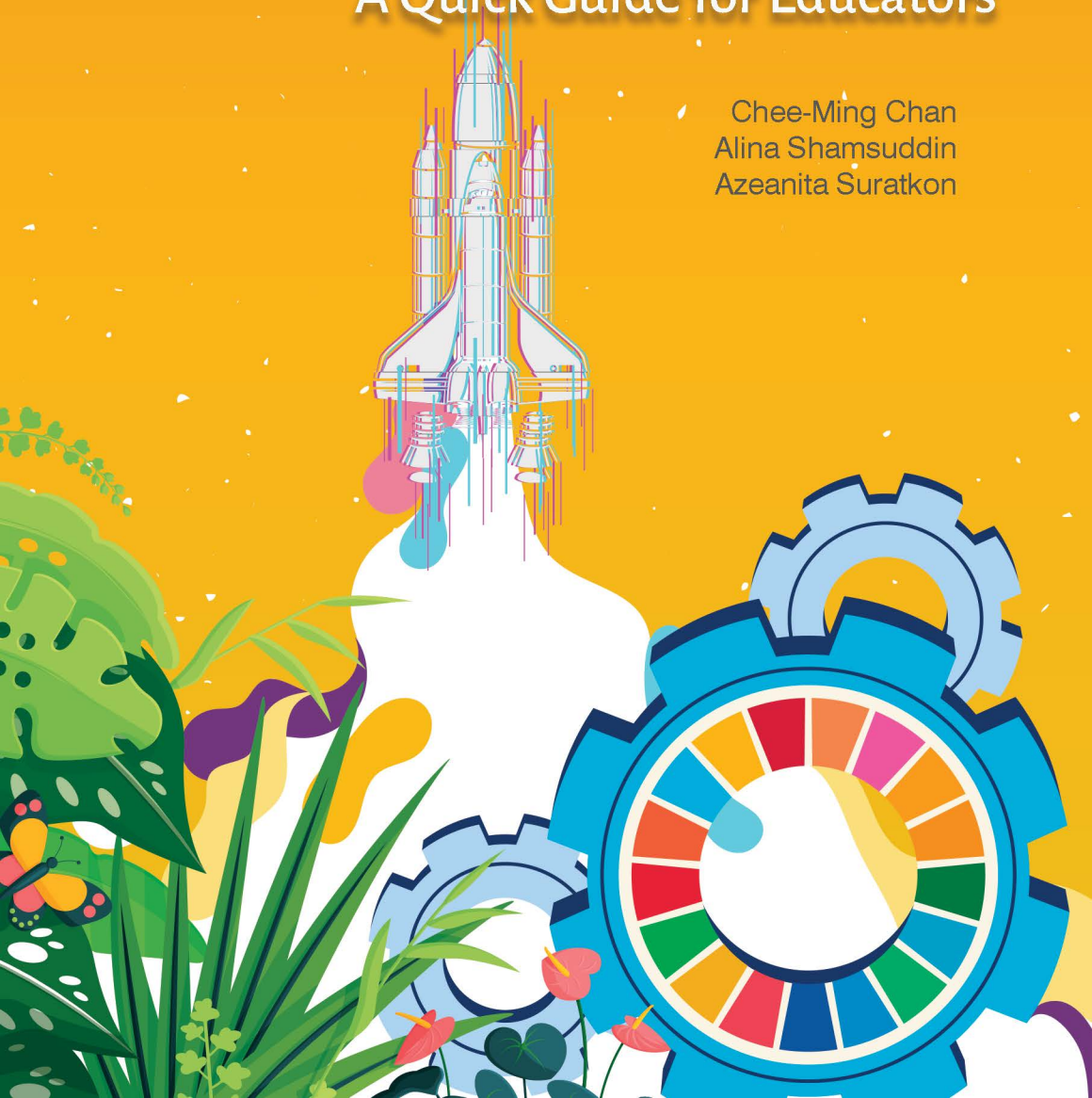
Keywords: Decent work, Equality, Infrastructure, Justice, technology

SDGs

in Engineering & Technology:

A Quick Guide for Educators

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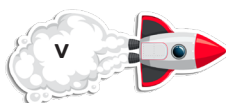
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Preface

Sustainable development is the responsibility of all, especially for the present generation who would be keeping Earth 'battered but intact and adequate' for the future inheritors. This is befitting the definition of sustainable development itself, which is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

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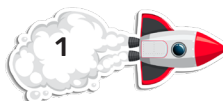


1. Our Discourse



Sustainable Development Goals, or more commonly known as SDGs appear to be the buzzword these days within and beyond the academia. This is understandable, considering the inter-relationship between industry and university in grooming the future professional workforce to meet the nation's market demand, global economic growth and humanity's continuous development. The responsibility is equal, if not indivisible indeed. One cannot possibly educate and train proteges without a guideline of the designated attributes desirable at the end of the learning process. Hence the continual improvement cycle is a dynamic engagement, where both the university and industry must share a common understanding of the SDGs' aspirations, to jointly 'do' the sustainable development works towards a mutual, ultimate goal.

This book is directed at what universities can do to effectively incorporate SDGs in the curriculum and syllabus of engineering and technology programs, without unnecessary upheaval of the existing delivery system leading to cumbersome rearrangements and unending paperwork. More importantly is the compliance with existing academic Standards overseen by the respective governing authorities, i.e. Engineering Accreditation Council (EAC) and Engineering Technology Accreditation Council (ETAC), both under the Board of Engineers Malaysia (BEM).



2. Introduction and Definitions



SDGs: The history.

A yellow slide with a rocket icon on the left. It features a portrait of Nikola Tesla and a photo of the United Nations Conference on Environment and Development. The text on the right reads: "Nikola Tesla (1856-1943)" followed by a list of bullet points. The bottom right corner shows "1/19".

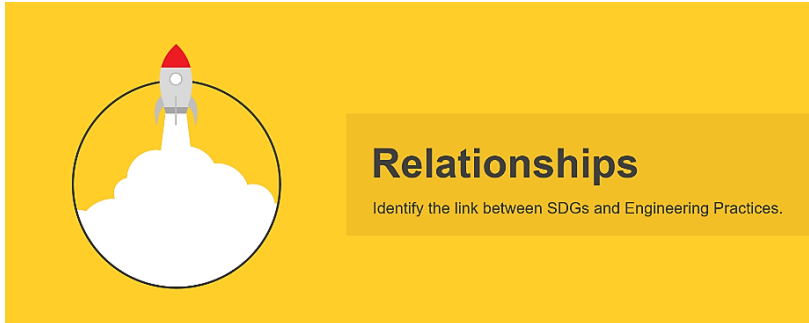
Nikola Tesla (1856-1943)

- The **father** of "sustainable development".
- United **Nations World Commission on Environment and Development** was coined the term **sustainable development**.
- There are **3 pillars** in sustainable development: **Economy**, **society** and the **environment**.

Nikola Tesla (1856-1943) was a Serbian American engineer, born and raised in the Austrian Empire. He grew up to be a multi-talented technologist, futurist and inventor, most well-known for laying the groundwork for the modern-day electricity generation and delivery systems. Ironically, Tesla studied engineering and physics in the 1870s without receiving a degree. Having the foresight of what was yet known or proven then, Tesla envisaged creating an energy grid that harnessed renewable forms and bring the concept of "sustainability" to science in every way imaginable, though little did he realize it! Apparently ahead of his time, Tesla proposed using geothermal, solar



3. Relationships



So, what has the global issues encapsulated in the SDGs got to do with teaching and learning at institutions of higher learning? The engineering and engineering technology curriculum is widely scoped and rightly restructured to factor in the considerations of various repercussions of technical solutions to the environment, society and economy of the larger context. Nonetheless to effectively teach and guide students towards embracing SDG practices as part of their professional education requires more than that. Specific introduction of the relevant elements via suitable channels in the respective subjects is necessary to provide a systematic and progressive inculcation of the values. This is very much in line with the program accreditation standards, such as the ones overseen by the Board of Engineers Malaysia (BEM). These include the Engineering Technician Education Programme Accreditation Standard 2024, Engineering Technology Programme Accreditation Standard 2024 and Engineering Program Accreditation Standard 2024. The former two are under the purview of Engineering Technology Accreditation Council (ETAC), while the latter is under the charge of Engineering

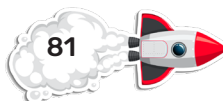


4. T&L Activities and Assessments



In designing the Teaching and Learning (T&L) activities, alignment with the Program Learning Outcomes or Program Outcomes (PLOs / POs), which trickle down to the respective Course Learning Outcomes (CLOs) of the courses within a program is a good place to start. This is a routine task for all lecturers indeed at the prior to the beginning of each semester: To review the inputs for Continuous Quality Improvement or CQI from the past semester, then to craft the T&L activities according to the CLOs complying to the learning domains and levels usually predetermined for the entire curriculum. Additional fine-tuning would involve selection and incorporation of the relevant or targeted SDGs in the activities assigned.

It follows that the incorporation of SDGs in alignment with CLOs is a straight forward way to ensure suitable and correct matching of the learning outcomes intended, with the added values of sustainable development awareness being inculcated among



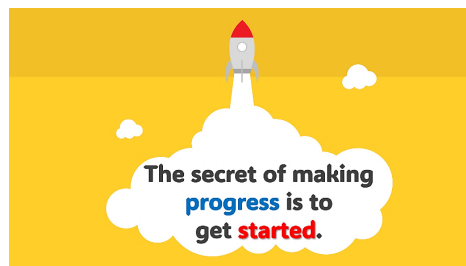
5. Summary



Sustainable development is about keeping Earth well for the coming generations, and that EDUCATION is the key to ensure all earthlings' conscious readiness to do their respective parts.

It may seem a daunting task to incorporate SDGs into existing curriculum, syllabus and lecture delivery domains. Nonetheless as shown in the explanations and examples, it is totally DOABLE.

The clock is ticking. With barely 5 years left to reach the finishing line, what remains to be done requires haste and commitment. Let's recoup, review and revise the way we teach the students.



It is no longer a one-way knowledge transfer highway, but a multi-channel cultivation of inter-related disciplinary knowhow and skillsets via experiential, practical, immersive learning. Take note that EVERY channel leads back to sustainable development.

The time to change is NOW.



Bibliography

Carson, R. (1962). *Silent Spring*. Fawcett Publications. [https://doi.org/10.1016/0027-5107\(77\)90059-8](https://doi.org/10.1016/0027-5107(77)90059-8)

Dalby, S., Horton, S., Mahon, R., & Thomaz, D. (2019). *Achieving the sustainable development goals: Global Governance Challenges*. Routledge Taylor & Francis, New York.

Jessie Hohmann and Daniel Joyce. (2019). *International Law's Objects*. Oxford University Press.

Lafferty, W. M., & Meadowcroft, J. (2000). *Implementing sustainable development: Strategies and initiatives in high consumption societies*. OUP Oxford.

Nations, U. (1987). *Brundtland Report (1987): Our Common Future*. United Nations. <https://doi.org/10.4324/9781351279086-15>

Nations, U. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. United Nations.

Organisation for Economic Co-Operation and Development (OECD). (1998). *Towards Sustainable Development: Indicators to Measure Progress*. OECD Rome Conference Proceedings. <https://doi.org/10.4337/9781782541257.00009>

Raworth, K. (2018). *Doughnut economics: Seven ways to think like a 21st century economist*. Chelsea Green Publishing.

Sachs, J. D. (2015). *The age of sustainable development*. Columbia University Press.



Schönherr, N., & Martinuzzi, A. (2019). *Business and the sustainable development goals: Measuring and managing corporate impacts*. Springer.

Walker, J., Pekmezovic, A., & Walker, G. (2019). *Sustainable development goals: Harnessing business to achieve the SDGs through finance, technology and law reform*. John Wiley & Sons.



Biography

Prof. Ir. (Ingenieur) Dr. Chee-Ming Chan

Prof. Ir. Dr. Chee-Ming Chan is currently a Professor with the Department of Civil Engineering Technology, Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia. She is also a Chartered Engineer with the Institution of Engineering & Technology, UK, and a Professional Engineer (Ir.) registered with BEM of Malaysia. Prof. Chan was previously a postdoctoral visiting scholar at the Port and Airport Research Institute in Japan from 2009–2011. Prof. Chan's first degree (BSc. Civil Eng.) was awarded by KUiTTHO-UTM, Malaysia in 2001. She then pursued her PhD in Geotechnical Engineering at the University of Sheffield (UK), returning in 2006 to serve at the present university. In addition, Prof. Chan has published over a dozen books, including *The Sinking Earth* (2012), an easy-to-read introductory book to ground improvement techniques, as well as the *Dredging: An Introduction for Technologists* (2021), the first technical book on dredging technology in the national language, Bahasa Malaysia. Her research interests have always revolved around sustainable geotechnics, with innovations to make poor quality soils into usable materials. Her research effort in this direction has received recognition with the award of several grants worth over 150,000 USD from various national agencies and the industry.



Prof. Ts. (Technologist) Dr. Alina Shamsuddin

Prof. Ts. Dr. Alina Shamsuddin is a Professor of Technology Management at the Faculty of Technology Management and Business, University Tun Hussein Onn Malaysia (UTHM). She was one of the founding members of her faculty. She obtained her PhD in Performance Measurement from the University of Strathclyde, Glasgow in 2007. Her academic experience spans more than 20 years, where she has honed her expertise in Technology Adoption, Supply Chain Management, and Halal Logistics. She is passionate about making a difference in the quality of program design and delivery in higher educational arena, institutionally and nationally. She is actively involved in program development at her university and has more than 10 years of experience as a program and institutional auditor for the Malaysian Qualification Agency (MQA). She has served as a program external examiner particularly in Technology Management for various universities. Dr. Alina has been consulted by various Polytechnics, *Kolej Kemahiran Teknologi Mara* (KKTM), and Vocational Colleges for her expertise in academic assessment and assurance. She regularly appears at international conferences and workshops as guest/keynote speaker, sharing her views on outcome based education (OBE) practices. She has led a research portfolio of more than RM500,000 and has been involved in projects valued at almost RM2 million. At the community level, Dr. Alina is currently a board member of Hidayah Islamic School Batu Pahat.



Associate Prof. Ts. (Technologist) Dr. Azeanita Suratkon

AZEANITASURATKON is an Associate Professor in the Faculty of Civil Engineering and Built Environment at Universiti Tun Hussein Onn Malaysia (UTHM). She has a strong academic foundation in construction and project management. Her academic journey began with a Diploma in Quantity Surveying in 1998, followed by a Bachelor of Science in Building from Universiti Teknologi Malaysia, Skudai, Johor, in 2000. She completed an MSc in Construction Management (Project Management) at Heriot-Watt University, Scotland, in 2004 and earned a PhD in Construction Management from Chiba University, Japan, in 2013. Her previous roles include Deputy Dean for Student Affairs and Alumni and Head of Department, while she currently serves as a key researcher in a sustainability-driven research focus group. She has been actively involved in the development of academic programs, notably as a committee member for the revision of the Bachelor of Civil Engineering curriculum, and previously led the development of the Bachelor of Architecture program at UTHM. Her consulting work includes designing the Diploma in Construction Technology for Kolej Kemahiran Tinggi MARA (KKTM) Sri Gading and conducting assessments on the implementation of MS2593:2015 standards for construction site worker accommodations for the Construction Industry Development Board (CIDB) of Malaysia. Her publications include book chapters, journal articles and conference proceedings, with a focus on topics such as construction management, sustainable construction, adaptive reuse, and green maintenance of heritage buildings.



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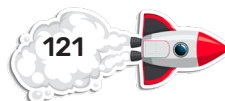
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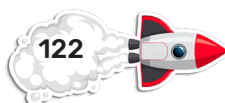
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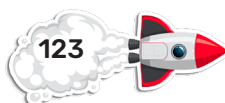
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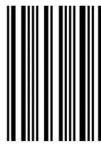
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