

The nature of IACEE's SERINA's content, relative to the Association's 2016 Porto Declaration

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Abstract

SERINA (**Sustainable Education and Research in Action**) is a global engineering education initiative of the International Association for Continuing Engineering Education (IACEE). SERINA stems from the organisation's Porto Declaration of May 2016, being a pledge by members to seek solutions to 21st Century Grand Challenges threatening human survival.

Launched in Monterey Mexico in May 2018, SERINA is an online portal and databank dedicated to the support and promotion of engineering education and research that best demonstrates or seeks to demonstrate active practices of sustainability and engagement within the communities that the initiatives aspire to serve.

The paper highlights the origins of SERINA as a research project. It focuses on a number of the best UN Sustainable Development Goals linked to Engineering initiatives and practices as well as meeting the set of Fundamental Human Needs as proposed by Max-Neef. These initiatives and practices were initially qualitatively and quantitatively researched centred on the IACEE membership organisations and then qualitatively highlighted in the SERINA project. To these were added, over the last three years other engineering focused projects from around the world.

This paper also highlights how these sustainable initiatives link to the Sustainable Development Goals, as well as how they work towards meeting human fundamental needs. The SERINA project is intended to create a database of Education, Research and Active Practices highlighting initiatives for students and others, particularly Engineers, so as to be hopeful of the future and to develop a mindset of SDG practice within their intended projects of the future.

Keywords: Sustainability, SERINA, Continuing Engineering Education, UN Sustainable Development Goals, Training, Sustainable Engineering Practice, Fundamental Human Needs

1. Introduction

During the May 2016 International Association for Continuing Engineering Education World Conference under the theme “Innovation in Continuing Professional Development: A vision of the Future”, a declaration was made and signed by the IACEE conference participants. The declaration acknowledged the likely destructive effects of climate change on our planet and its possible long-term negative effects. The declaration was tabled and agreed to. In doing so the IACEE recognised the need to face up to and acknowledge the issues surrounding climate change and its possible effects for the future. The membership in particular recognised the role that engineers could play in moderating many of the future climate change consequences.

Below is a transcription of the declaration:

“Porto Declaration, May 20, 2016

Whereas the International Association for Continuing Engineering Education (IACEE) was founded in 1989 to foster a global network of organizations promoting lifelong engineering education.

Whereas the IACEE recognises the scale and complexity of the gap between existing solutions and the needs facing our planet and that the IACEE is uniquely placed to act on this opportunity.

Whereas the IACEE seeks to pivot the organisation to connect individuals, universities, industry, government and NGO organizations to meet the grand challenges facing humanity.

Now therefore in keeping with its dedication to leading lifelong learning, the IACEE will develop global initiatives to address those 21st century challenges threatening the survival of humankind through collaboration, design, creative thinking and engineering.

We the undersigned do hereby declare this at the IACEE 2016 Global Conference in Porto Portugal and pledge our commitment in actioning this call to service.”

(http://www.iacee.org/docs/PORTO_DECLARATION1.pdf)

In response to the above declaration a research project was proposed and initiated with the task of identifying what was already being achieved in this regard within the membership’s body.

The initial aim was to research and create a list of sustainability practices by the IACEE membership bodies so as *“to prioritise the low hanging fruit of influential organisations where we have our best connections and who would be most likely to be working in the sustainability space. Sustainability matters in the 21st Century can be broad as we have very many global challenges to consider.”* (E-mail: July 2017- IACEE, Vice President - Global Initiatives)

The above proposal was put into action and explored, researching each of the IACEE 2017 membership’s institutions websites. The IACEE Executive at its quarterly meeting in Beijing, late 2017, made the decision as a benchmark evaluation tool to use the United Nations 17 Sustainable Development Goals (SDGs) (<https://sdgs.un.org/goals>). The concept of Fundamental Human Needs (FHNs)

(A.E.Smith (2001); Max-Neef, et al (1989),) was added as a second based tool for evaluating the meeting of sustainable practices across the IACEE membership.

This then led to the development of the SERINA (**Sustainable Education and Research in Action**) project. This initiative was unveiled to members at IACEE's 16th World Conference in Monterrey, Mexico in May 2018 and formed a strategic pathway to this next World Conference hosted by the Norwegian University of Science and Technology, Trondheim, Norway in May, 2021.

The overarching objective of SERINA is to utilize the unique and dynamic positioning of the IACEE, its Porto Declaration and its membership to connect and encourage individuals, education providers, industry, government and NGO organizations to meet the 21st century grand challenges facing humanity and the world. More specifically, it is about how best we are able to use engineering education and education, as well as practicing engineers more broadly, as a catalyst to foster global collaborations and solutions that can have real, meaningful and tangible impact within communities throughout the world. SERINA is **solution focused**.

2. Methodology

At its high level, the research method here sets out to provide evidence of significant activity in engineering sustainability initiatives taking place around the world, many of which involving the active practice of sustainability within the IACEE membership.

The research has provided a positive narrative for sustainability education and research initiatives that shifts the focus away from a doom and gloom framing of the challenges to active practice in meeting the UN Goals. The intention then of IACEE with SERINA is to be solution focused and to highlight, encourage, support and grow the incredible work that is being done at all levels by people and organisations throughout the world to empower and inspire others to do the same.

1. The first step was to access the membership websites and use their website search feature to look for and list sustainable initiatives.
2. The next step involved categorising the initiatives against the United Nations 17 sustainable development goals. So utilising the criteria of the UN Sustainable Development Goals classifications and Fundamental Human Needs in the case of SERINA as developed by Manfred Max-Neef (See above for details).
3. A third step of the research was to look at a sample of organizations and initiatives beyond that of the immediate membership base for possible best practice.

Sequentially and in more detail the research approach was as follows:

Phase One:

1. It first entailed reviewing thousands of IACEE membership initiatives. The first two website search pages for each organisation were analysed, and at times a third page when a third page became available linking to relevant

sustainable practises. Due to time constraints the investigation did not go deeper.

2. A number of the membership bodies had no reference to sustainability on their website search pages. This made up approximately 1/3 of the membership bodies. This does not mean that those bodies were not involved in some form of sustainability practice.
3. The links found were then analysed using the SDGs as benchmarks.
4. It was also needed to include “Sustaining” what was from the past in a cultural and Infrastructure way as something that is important as being linked to the place and time. The use of the Fundamental Human Needs model was brought in later to help here, as the FHNs model is very much linked to community’s sense of “Identity”. Human beings have a fundamental human need to establish a clear Identity as this can then be linked to sound mental health, well-being and place.

Phase Two:

1. The next step was to cherry pick some of the most relevant sustainability membership links to act as examples and to make these available via an IACEE website portal. A website on which the Association would have an explanation of what this project is all about, being connected to the Porto Declaration, meeting certain UN Goals and Fundamental Human Needs.
2. This led to the development of the SERINA project and now linked to Fundamental Human Needs. SERINA as explained above is a key global initiative in sustainability being developed by the IACEE in a practical way to further the objectives articulated in the Porto Declaration. This initiative was unveiled to members at IACEE’s 16th World Conference in Monterrey Mexico in May 2018 and forms a strategic pathway to the next World Conference in Trondheim Norway in 2020. It became live first on Facebook in July 2018 and then also as a stand-alone IACEE website and finally on LinkedIn.
3. SERINA posts are created weekly from internet searches using primarily “Sustainable Engineering Education”, “Sustainable Engineering Research” or “Sustainable Engineering Active Practice”, “Circular Economy” [Ref 6] amongst others. There was also some reliance on using members suggestions.
4. Once a relevant post is found it is analysed against the below criteria:
 - Sustainable Engineering:
“Education”, “Research”, “Active Practice” or “Circular Economy”?
 - Which UN SD Goals then are being met:
1 "End Poverty", 2 "Zero Hunger", 3 "Good Health and Well-Being, 4 "Quality Education", 5 "Gender Equality", 6 "Clean Water and

Sanitation", 7 "Affordable and Clean Energy", 8 "Decent Work and Economic Growth", 9 "Industry, Innovation, and Infrastructure", 10 "Reduce Inequality", 11 "Sustainable Cities and Communities", 12 "Responsible Consumption and Production", 13 "Climate Action", 14 "Life Below Water", 15 "Life on Land", 16 "Peace, Justice and Strong Institutions" and 17 "Partnerships for the Goals"?

- Which Fundamental Human Needs:

"Subsistence", "Protection", "Understanding and Meaning", "Participation", "Identity" and "Creation"?

5. # tags are then assigned from the following list so as to link posts across the site in Facebook:

#SustainableEnginActPrac #SustainableEnginResearch
#SustainableEnginEdu #SustainableEnginCircularEconomy, and

#SDG1 #SDG2 #SDG3 #SDG4 #SDG5 #SDG6 #SDG7 #SDG8 #SDG9
#SDG10 #SDG11 #SDG12 #SDG13 #SDG14 #SDG15 #SDG16 #SDG17,
and

#FHNProtection #FHNCreation #FHNIdentity #FHNSubsistence
#FHNUnderstandingandMeaning #FHNParticipation

3. Results

1. Phase One

Research findings relating to the membership 2017 websites and linked to the SDGs:

SDG	Number of Websites
1. No Poverty	- 2
2. No Hunger	- 8
3. Good Health and Well-being	- 8
4. Quality Education	- 23
5. Gender Equality	- 3
6. Water and Sanitation	- 29
7. Affordable and Clean Energy	- 42
8. Decent Work and Economic Growth	- 9
9. Industry, Innovation and Infrastructure	- 48
10. Reduce Inequalities	- 1
11. Sustainable Cities and Communities	- 60
12. Responsible Consumption and Production	- 42
13. Climate Action	- 15
14. Life Below Water	- 12
15. Life on Land	- 25
16. Peace, Justice, and Strong Institutions	- 7
17. Partnerships for the Goals	- 34

As can be accessed from the above SDGs references 11, 9, 7, 12, 17, 6, 15, 4, 13 and 14 were of greater significance across the board. With SDG 11.

“Sustainable Cities and Communities” and SDG 9 “Industry, Innovation and Infrastructure” having the highest number of references. Not surprising considering the Engineering focus of the membership.

It has already been noted above that a number of the membership bodies made no reference to sustainability on their website search pages. This made up approximately 1/3 of the membership bodies. This does not mean that those bodies were not involved in some form of sustainability practice.

386 sites were found all together that can be linked to the SDGs and could be broadly headed under: Research, Education or Active Practice.

Other sites and findings of importance:

48 Sustainability Studies and Courses outside of the membership also came to light and linked to 50 other sites over and above the membership also discovered this led to Phase Two: The SERINA Project.2.

The SERINA Project:

393 posts have been created to date. Reaching 15034 people and having 2193 engagements. With:

Sustainable Engineering Education posts reach and engagement -116
Sustainable Engineering Research - 106
Sustainable Engineering Active Practice -171

Research findings relating to SERINA Facebook posts and linked to the SDGs:

SDG	Number of Posts
1. End Poverty	- 25
2. Zero Hunger	- 25
3. Good Health and Well-being	- 45
4. Quality Education	- 90
5. Gender Equality	- 3
6. Clean Water and Sanitation	- 80
7. Affordable and Clean Energy	- 122
8. Decent Work and Economic Growth	- 54
9. Industry, Innovation and Infrastructure	- 149
10. Reduce Inequalities	- 20
11. Sustainable Cities and Communities	- 176
12. Responsible Consumption and Production	- 109
13. Climate Action	- 197
14. Life Below Water	- 58
15. Life on Land	- 55
16. Peace, Justice, and Strong Institutions	- 46
17. Partnerships for the Goals	- 85

Of significance the Post that had the most reaches (489) and engagements (64) was headed: **“Readying Today’s Higher Ed Students to tackle the World’s Grand Challenges”**

“An ABET Issue Brief Fall 2018 SUMMARY: Advancing sustainable solutions to the world’s most pressing environmental challenges will take more than technical skills. Students of higher education, especially those in STEM fields, need diverse and global perspectives to understand—and address—long standing problems in new ways”

https://www.abet.org/wp-content/uploads/2018/11/ABET_Sustainable-Engineering_Issue-Brief.pdf

In summary the above ABET (Accreditation Board for Engineering and Technology) brief states: “Advancing sustainable solutions to the world’s most pressing environmental challenges will take more than technical skills. Students of higher education, especially those in STEM fields, need diverse and global perspectives to understand—and address—long standing problems in new ways”

It poses a number of “Recommendations to scale best practices” in STEM education programs:

1. Be intentional in the integration of global issues and differing cultural factors
2. Create opportunities for students to connect the traditional, the unexpected and the exceptional
3. Keep students at the centre when shaping educational experiences
4. Allow the educational experience to bleed into professional experiences, and vice versa
5. Prioritize immersive experiences that reinforce diverse thinking, but don’t underestimate the need to have a diverse classroom from the start

4. Conclusions

SERINA is the creation of an online super-portal, leveraging off the United Nations 17 Sustainability Development Goals and meeting Fundamental Human Needs. It’s a space to build global engineering focused communities and to share with the world the inspiring work solutions and stories of what is taking place in sustainability education and research with emphasis on how this translates into active practices of sustainability.

The portal is open to all, particularly STEM students and practicing engineers, to learn about some of the best of sustainability engineering initiatives and practices from around the world by giving examples of who is doing what, where and how. This also enables peers to connect with and learn from each other to create new sustainability collaborations and initiatives.

At a high level, the research has and continues to provide evidence of significant activity in sustainability initiatives taking place around the world, many of which involving the active practice of sustainability within communities. Meeting some of the call below:

“Today, STEM education must be far more innovative than ever before. It must remove disciplinary borders, be grounded in collaboration, informed by business, and, at its core, be customizable and flexible to the changing world around us.” (*ABET fall 2018*)

This research has provided a positive narrative for sustainability education and research initiatives that shifts the focus away from a doom and gloom framing of the challenges. The intention then of IACEE with SERINA is to be solution focused and to highlight, encourage, support and grow the incredible work that is being done at all levels by people and organisations throughout the world to empower and inspire others to do the same. As noted in the introduction, the overarching objective of the Porto Declaration is to utilise the unique and dynamic positioning of the IACEE and its membership to connect individuals, universities, industry, government and NGO organisations to meet the 21st century grand challenges facing humanity and the world. More specifically, it is about how best we are able to use engineering education and education more broadly as a catalyst to foster global collaborations and solutions that can have real, meaningful and tangible impact within communities throughout the world. This is the significance of SERINA for engineering education.

Engineering Education and Continuing Engineering Education are crucial to handle the scale and complexity of the gap between existing solutions and the needs facing our planet. Engineers are uniquely placed to act on this opportunity. Through initiatives like SERINA it is possible to connect individuals, universities, industry, government and NGO organisations to meet the grand challenges facing humanity and the world.

Lifelong learning has developed and can continue to develop global initiatives to address those twenty-one century challenges threatening the survival of humankind through collaboration, design, creative thinking and engineering. The Porto Declaration via SERINA may motivate the engineering community and influence a majority of stakeholders to comply with a framework of global sustainable development.

REFERENCES

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POSTSCRIPT HANDOUT

Some thoughts for you and your organisation

1. Knowledge of the SDGs
 - Are you familiar with UN's work on sustainability?
 - Have you arranged – or are you planning – seminars or other activities on the SDGs?
2. Vision and goals – connections to the SDGs
 - What are your vision and goals?
 - Can you see any connections to the SDGs?
 - Can they be developed to get a more sustainable approach?
3. Strategic documents on topics associated to the SDGs; environment, climate, equality
 - What strategic documents do you have?
 - Are there any related to the SDGs?
 - Which goals do they cover?
 - Can they be developed to cover more of the SDGs?
4. Actions in the field of SDG
 - What actions do you take in field of the SDGs?
 - Which of the SDGs are you addressing today in your organisation?
 - Which of the SDGs does your organizations plans to address in the next 1-3 years?
 - Is there a part of your organisation which looks after sustainable development initiatives and, if so, what form does it take?
5. Level of interest/possibilities in future work with the SDGs and SERINA within the IACEE
 - Can you value the level of interest to deepen your work with the SDGs and SERINA?
 - Is there a SDG movement within your organization?
6. Options and threats
 - How could a deeper engagement in the SDGs contribute to your operation and image?
 - Do you see threats in your positioning towards a more sustainable alignment?
 - As discussed, there are three practical challenges coming out of this study:
 - a) How does your organisation deliver the concept of sustainability via your courses?
 - b) What research in your organisation picks up the concept of sustainability as an element of research?
 - c) How does your organisation apply these sustainability goals/principles in a practical communitarian grassroots manner on your campus or in your office?