# Embedding Sustainability in Engineering Education World Café: Reflections for Future Practice

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## SUMMARY

We present the reflective learning account from organising a World Café to share engineering educators' practices in embedding sustainability education, addressing the question: is the World Café a good practical solution to share sustainability education practice in our post pandemic world? Conversations have the power to create change, in line with approaches such as Critical Pedagogy (Giroux, 2020). Our perspective as diverse engineering educators informed the workshop and our reflections and this is mirrored in our analyses. The World Café is a process which has been extensively used to encourage open communication and problem solving (Brown, Isaacs and World Café Community, 2005) and which we thought relevant to enhancing sustainability education practices. A commitment to education for sustainable development (ESD) is increasingly expected (UNESCO, 2023; AdvanceHE and QAA, 2021) and engineering educators are rising to the challenge. Learning from one another, educators shared their actions, plans and dreams around the three pillars of sustainability. Using a Word Café to discuss challenges around sustainability education proved successful. We recommend that engineering educators and conference organisers consider this approach in creating a sense of urgency around sustainability that instigates collaboration and acts as a catalyst for action. The approach can be taken further by using it as a data collection tool, co-creating knowledge from our practice.

# INTRODUCTION

As we look to the future of engineering education, a key consideration should be what our role is in continuing to address the most important global issues and in particular the challenge of sustainability. Many of our students are now of Greta Thunberg's generation and active campaigners for change. Although their civic participation may reduce at the start of their engineering studies (Lin & Hess, 2022), their commitment to environmental related career goals increases as they progress in their degrees (France et al, 2022).

We invited participants of EERN 2023, the first in person Engineering Education Research Network meeting after the COVID-19 pandemic, to be part of this conversation. To us, the pandemic highlighted how important face to face contact is and how valuable the limited opportunities for educators from different universities to get together are. We thank participants for their active involvement.

In this paper, we share our reflections on the use of a World Café (Brown, Isaacs and World Café Community, 2005) to share a conversation that might lead to improvements in how engineering educators embed sustainability education in their practice. Firstly, we reflect on the power of conversations. Secondly, we discuss the World Café as a methodology, sharing our learning and personal reflections. Thirdly, we delve into our insights on what our colleagues are doing to embed sustainability in their practice. By doing this, we address the question: is the World Café a good practical solution to share sustainability education practice in our post pandemic world?
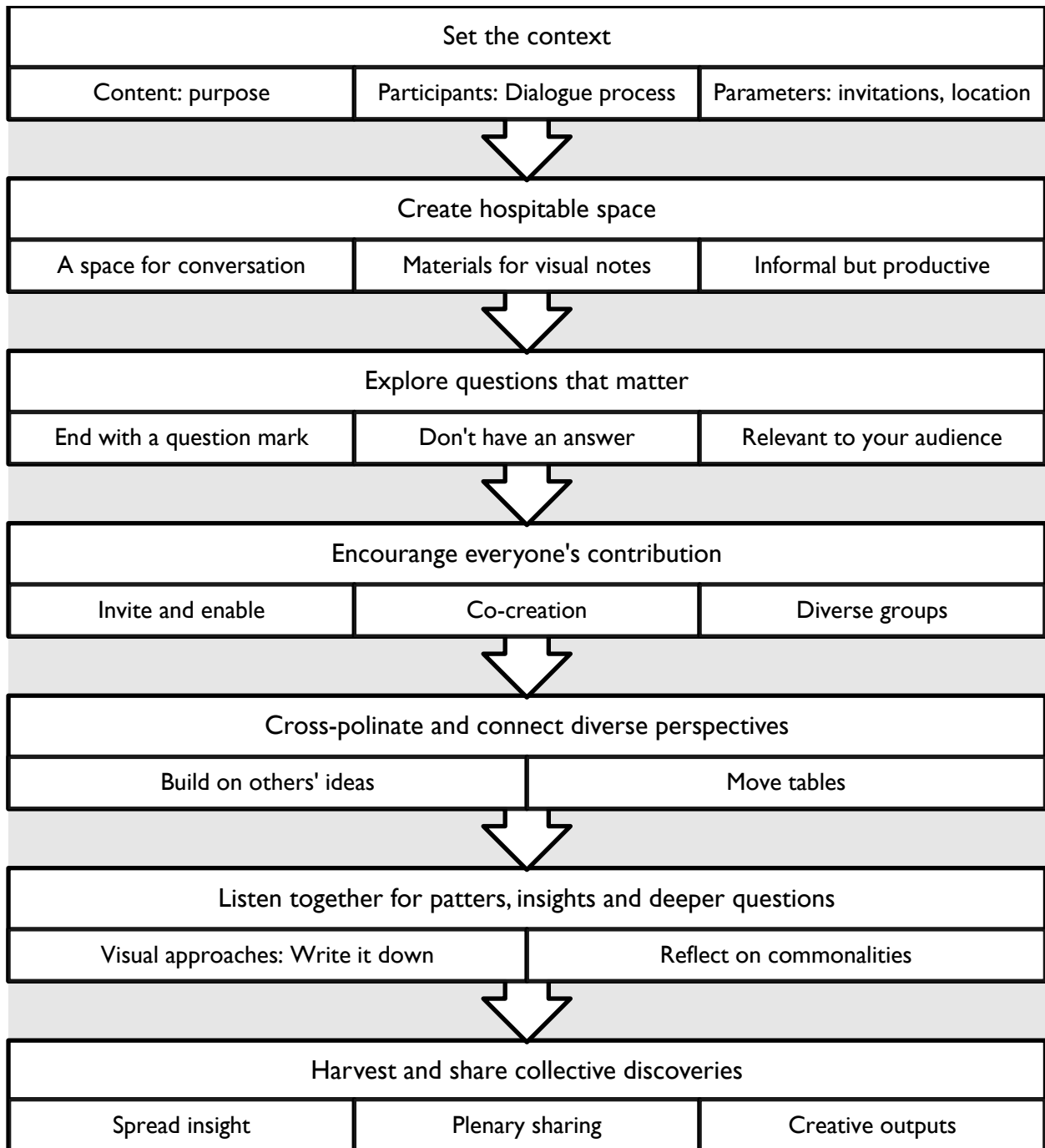
# THE POWER OF CONVERSATIONS

The authors met to organise this workshop, at a colleague's suggestion that we could lead a World Café for EERN. This started a conversation that led to a positive, and we hope long-lasting, collaboration. As engineering educators, the invitation resonated with our belief in the power of conversations in adult learning and our commitment to active learning.

As championed by Critical Pedagogy (Giroux, 2020), open conversations allow learners to use their experiences and critical thinking to co-create knowledge that can foster social change. We engaged in this same approach while we developed the World Café for EERN. We recognise that our positionality has an impact on our actions: we are educators working at a world leading UK university, we are also diverse individuals. The three of us were born in different countries; we all have international working experience, one mostly in higher

education while two also in industry; two of us are engineers while another is a psychologist; two are women, one a man. We recognise that we interpret the world through the lens of our own experiences. Because of this, we were interested in providing an opportunity for a conversation that would showcase the diverse views of engineering educators about sustainability.

*Figure 1. World Café principles*

| Set the context | | |
|---|---|---|
| Content: purpose | Participants: Dialogue process | Parameters: invitations, location |

| Create hospitable space | | |
|---|---|---|
| A space for conversation | Materials for visual notes | Informal but productive |

| Explore questions that matter | | |
|---|---|---|
| End with a question mark | Don't have an answer | Relevant to your audience |

| Encourange everyone's contribution | | |
|---|---|---|
| Invite and enable | Co-creation | Diverse groups |

| Cross-polinate and connect diverse perspectives | |
|---|---|
| Build on others' ideas | Move tables |

| Listen together for patters, insights and deeper questions | |
|---|---|
| Visual approaches: Write it down | Reflect on commonalities |

| Harvest and share collective discoveries | | |
|---|---|---|
| Spread insight | Plenary sharing | Creative outputs |

Source: Adapted from Brown, Isaacs and World Café Community (2005)

# THE WORLD CAFÉ

The World Café is a "process for bringing people together around questions that matter" (Brown, Isaacs and World Café Community, 2005, p. x). It has been extensively used to facilitate dialogue in various settings as varied as problem solving (e.g. Jori et al, 2020) and quality management (e.g. Lagrosen, 2019), and more recently as a method for qualitative data collection (Löhr, Weinhardt and Sieber, 2020; Monforte, Netherway and Smith, 2023). Moreover, evidence suggests that it is effective in improving strategic planning (Chang and Chen, 2015) and learning (Ropes, van Keef and Douven, 2020). The World Café follows key principles, presented in Figure 1. Before starting, it is important to consider the context to create a hospitable environment; during the Café, the host welcomes participants, explains the purpose and logistics, and leads progressive rounds of conversation take place on each question (participants move tables in each round), and final insights are shared in plenary; after the event, hosts share learning and insights.

The World Café methodology resonated with our views of education. We had participated in similar activities but never led them before. However, we had used similar participatory approaches in our teaching. We reflected on the name World Café and why it was chosen. Would participants feel invited to take part or alienated? Did we share an experience of a Café as a space to share? We concluded that World Café might mean a space where anyone, from any nation or any background can take part in a conversation. We reflected that sharing drinks and food was central to the way in which many cultures created inclusive environments.

As educators, we understand the importance of creating an environment where people can share very diverse views and knowledge. Because of this, the World Café lead spent time and effort in creating such an environment that creates enthusiasm for learning and a space where challenge is welcomed. We reflected that this does not create a safe environment, but one where learning is possible, an environment in which teachers and learners recognise their vulnerability and commit to respect and challenge each other, a confidential 'brave space' (Verduzco-Baker, 2018). To create this space, the session lead ensured tables were set for teamwork. They then welcomed participants at the door, inviting them to bring a hot drink and make themselves comfortable. Finally, they delivered a short presentation including a session agenda, with timings. This article is our means of sharing our collective learning with the group and beyond.

# SUSTAINABILITY EDUCATION

A commitment to education for sustainable development (ESD) is increasingly expected from education professionals (UNESCO, 2023; AdvanceHE and QAA, 2021). Aspects of sustainability have been integrated to engineering education courses, for example Murphy and her colleagues (2009) concluded that environmental sustainability was taught in US engineering courses over a decade ago. A more recent review of trends showed that we are moving from a focus on policies to a focus on educators' skills, strategies and networks (Tejedor, Rosas-Casals & Segalas, 2019). Evidence suggests that, to increase participation in sustainability education efforts, it is important for engineering educators to network and collaborate in conversations around what sustainable development means to them and how it can be implemented in practice (Hogfeldt et al, 2022).

To provide an opportunity to share knowledge around sustainability education, we organised a workshop following the World Café methodology. Semi-structured group conversations took place around each pillar of sustainability: social, economic and environmental (Purvis, Mao and Robinson, 2019), with opportunities for all participants to contribute to all three themes. We feared that engineering educators might focus too much on environmental sustainability, so we chose to use these areas to encourage broader conversations. Participants were invited to share what they had done, what they planned to do and what they dreamt of doing. After a set period, participants rotated to a different themed table where they had the opportunity to build on the conversations that had already taken place. An opportunity for plenary provided space to summarise learning and draw conclusions from the session. A summary of themes discussed is presented in table 1.

Contrary to our beliefs, much of the conversation focused on broad aspects of sustainability. It is interesting to note that systems thinking was mentioned in discussions around all three pillars of sustainability. This might indicate that participants are aware of how these aspects are connected and might believe that communicating this to students and peers is important as solutions are sought. More themes emerged in the social pillar than the other two. This might reflect an increased interest in this area and a recognition that environmental concerns are already considered in engineering. However, it seemed to us that detailed conversations on how engineers are addressing decisions around environmental engineering were absent. As well as sharing themes for each pillar, participants reflected on pedagogic practices that might support sustainability education. These related to perspectives (such as critical thinking, collaboration and reflection), planning (map programmes to SDGs, making sustainability part of the design process, tools (such as industrial projects or using examples), and assessment (e.g. including sustainability in assessment criteria, clear marking rubrics). These present a wide range of opportunities to improve sustainability education in our practice.

*Table 1. Themes presented by World Cafe participants*

| Social | Economic | Environmental |
|---|---|---|
| Systems approach | Change the business model | Circular economy |
| Human centred thinking | Sustainable life cycle | Systems thinking |
| Social responsibility | Continuity of benefits and impact | |
| Improving the experience of women in engineering | Systems thinking | |
| Remodelling engineering behaviours | | |
| Ethics in engineering decision making | | |
| Social inclusion | | |

**Pedagogic practice ideas**

Industrial projects

Critical thinking

Include requirements in assessments: e.g. wider picture and full life cycle

Clear marking rubrics and objectives

Reflective practice

Using examples from outside the field

Support research failure

Making sustainability part of the design process

Collaboration

Map programmes and modules against SDGs, use for advertising

Collaboration across disciplines

Source: Created by authors from information shared by workshop participants

## WORKSHOP EVALUATION

Using a Word Café approach to discuss challenges around sustainability education proved successful. The themes chosen provided a good structure to the session. Passionate conversations resulted from the broadness of the topics and interest shown by those attending the session. Information is always available and can be easily shared, a conversation provides added value. Participants shared their experiences and learnt from each other in a demonstration of true co-creation.

For a Café to be successful, it is important to create a welcoming environment (Brown, Isaacs and World Café Community, 2005). The role of the facilitator is key in this respect. In addition, hosts at each table played a key role in welcoming each group to the sub-theme and summarising the ideas that had already been shared. In this way, as groups ideas cross-pollinated as participants moved from table to table.

*Table 2. World Cafe Session Structure*

| | |
|---|---|
| Introduction to the session | 10 minutes |
| Conversations 1 | 10 minutes |
| Move tables | 5 minutes |
| Conversations 2 | 10 minutes |
| Move tables | 5 minutes |
| Conversations 3 | 10 minutes |
| Plenary | 10 minutes |

Source: Created by authors

The World Café provides an efficient approach to make the most of the time we have together. Timing was also crucial, so a clear structure was provided to the session (see Table 2). A key learning from leading this session was that although we could run the event in the allotted 60 minutes, conversations might have matured more if groups had spent more time in each table. World Café practitioners (ibid) recommend a minimum of 1.5 hours and indicate longer conversations are better; this allows to run three rounds of between 20 and 30 minutes. In attempting to run a World Café within the limitations set by a conference setting, we did not follow this advice, opting for 10 minute rounds. Hence, we join the World Café community in their recommendation.

During the workshops, the session lead noted that some participants were speaking for long periods while others did not participate in the first round; hence, they requested that each participant shared ideas for a minute each before an open discussion. Upon reflection, some participants tended to overshare, resulting in others not getting a chance to contribute due to time constraints. To address this, we recommend that the facilitator should incorporate into the ground rules the importance of ensuring equal participation. In addition, table hosts can act to promote conversations that include all participants. Although joining the conversation is not required in World Café settings, we reflected that adding additional structure might support the process. For instance, providing an egg timer for each table and indicating to participants to take turns to share while the timer is running and then pass along to the person next to them. Brown, Isaacs and World Café Community (2005) suggest having a *talking object* which participants can passed around as the conversation develops, this is another idea we might try in the future.

In line with World Café practices (ibid), a paper tablecloth, post-it notes and markers were provided to each table. Participants were encouraged to express their creativity, leading some to use drawings while others opted for bullet points, as seen in Figure 2. In the end, all the key points were compiled and discussed. This article is our way of sharing the results with wider audiences after the event.

*Figure 2. Example participants' contributions*
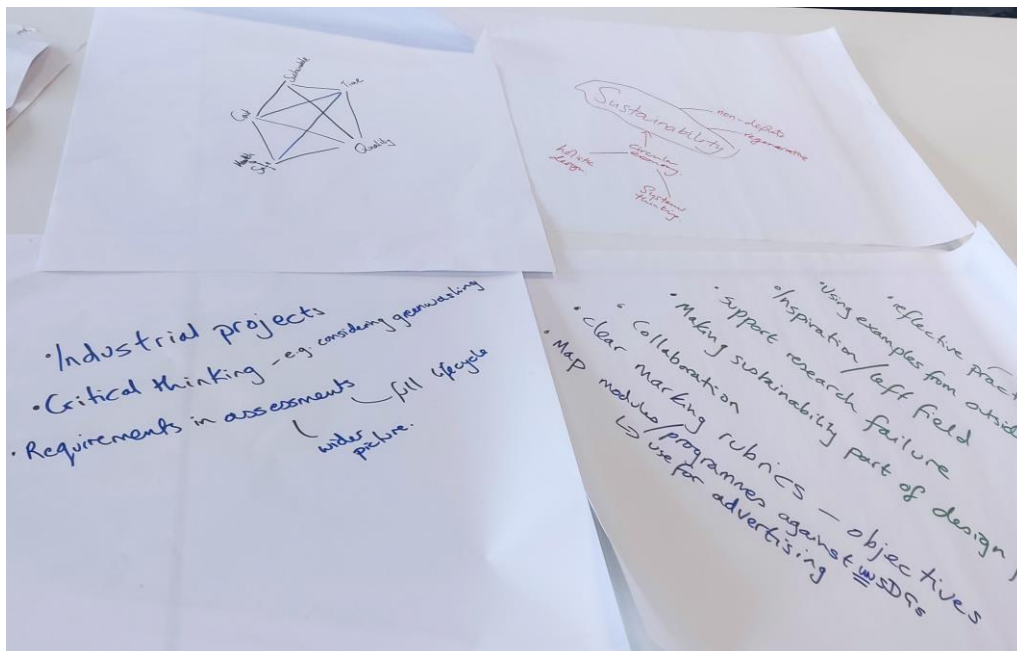


Source: Workshop participants

Some participants shared they enjoyed the session, providing informal feedback that the space had felt friendly. This is a value that can often be understated. It is important for participants to feel connected and confident that they are part of a community of practice. People from different universities and from different teams actively engaged, demonstrating the value of the World Café approach.

We felt we were working on this problem together and we could solve it together, by taking small actions that as a whole would make a big difference.  This was particularly important post-pandemic. We had years of staying at home and somehow forgot how to share with others. We might find comfort in working from home or joining events online. However, we are social beings and the experience of participating in a live conversation energised us. Overall, the workshops provided an excellent opportunity to share sustainability education practice in our post pandemic world.

## CONCLUSIONS & RECOMMENDATIONS

The World Café is a good tool to share and learn together. In using this format to invite colleagues at different stages of their careers to discuss challenges, plans and dreams for embedding sustainability education, it is possible to create that that environment where people can share ideas, explore options, and plan within a short amount of time.

Sustainability as a theme and the Word Café as a method work effectively to create a sense of urgency that instigates collaboration. Considering sustainability in its broader scope, focusing conversations on each of its three pillars, encouraged deep conversations that allowed participants to share their wide range of experiences and dreams. The theme was welcomed and allowed conversations to evolve. As suggested by World Café practitioners, we recommend that themes are clearly set to be relevant. It is also worth reflecting on the impact that choosing discussion themes has over conversations. It is possible that by choosing to clearly frame conversations around the three pillars of sustainability we limited the opportunity for participants to co-create the questions that matter in relation to Education for Sustainable Development. We believe that the World Café approach might be used to further engage and empower views that are not currently commonly accepted.

We encourage the use of the World Café in other academic conferences and teaching. In our experience, academic gatherings are spaces where one expert shares with their peers or students, a one-to-many approach. The World Café provides a space for conversation,

what we might call a many-to-many approach. Rather than an expert imparting knowledge, it allows to create knowledge together, develop collaborations and sharing ideas that might result in changes in practice. If organised at the beginning of longer events, we believe they can provide a good structure to develop further conversations after the session ends, facilitating networking. In this sense, the methodology is inclusive as it fosters an environment where all are valued members.

Using the World Café approach to discuss sustainability education provided an opportunity to think about how to improve our curriculum. The conversation proved a catalyst for action. Continuing this conversation can provide a means to ensure that we continue to act towards solutions to the climate crisis and towards true sustainable development. A next step might be to conduct similar Sustainability Education World Cafés as a data collection method to gather empirical data on what engineering educators are doing. This might in turn provide even better insights into practice in our profession, while generating change through action research. We recommend that ethical approval is sought ahead of running similar events, so the rich data gathered through the World Café conversations can be systematically presented.

In conclusion, the World Café is a good practical solution to share sustainability education practice in our post pandemic world. Continuing this approach can support the development of a community of practice that improves our shared understanding and actions towards embedding sustainability education in our pedagogical practice.

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