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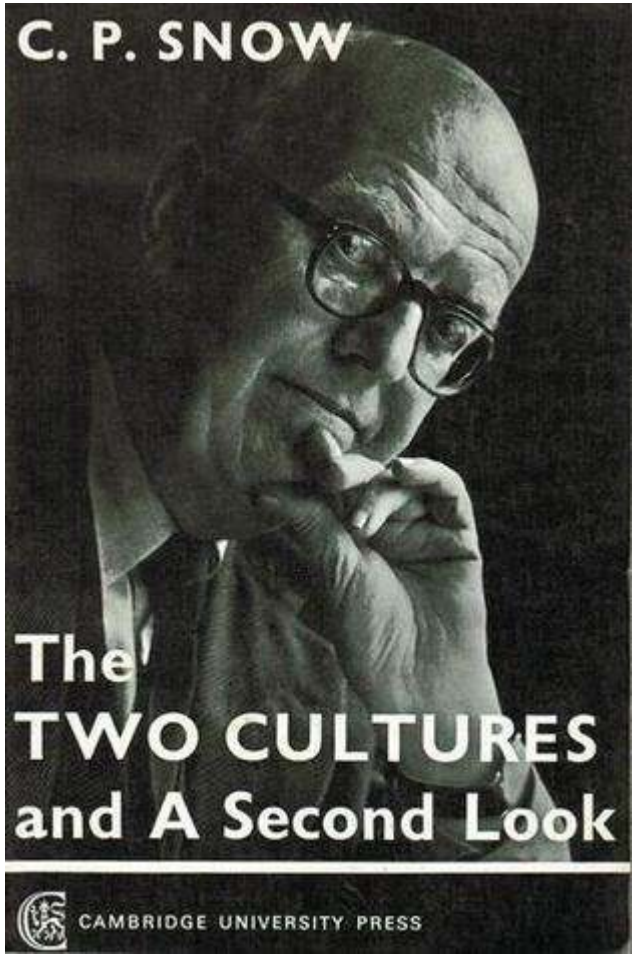


Engaging with Sustainability through Collaborative and Transdisciplinary approaches to Education

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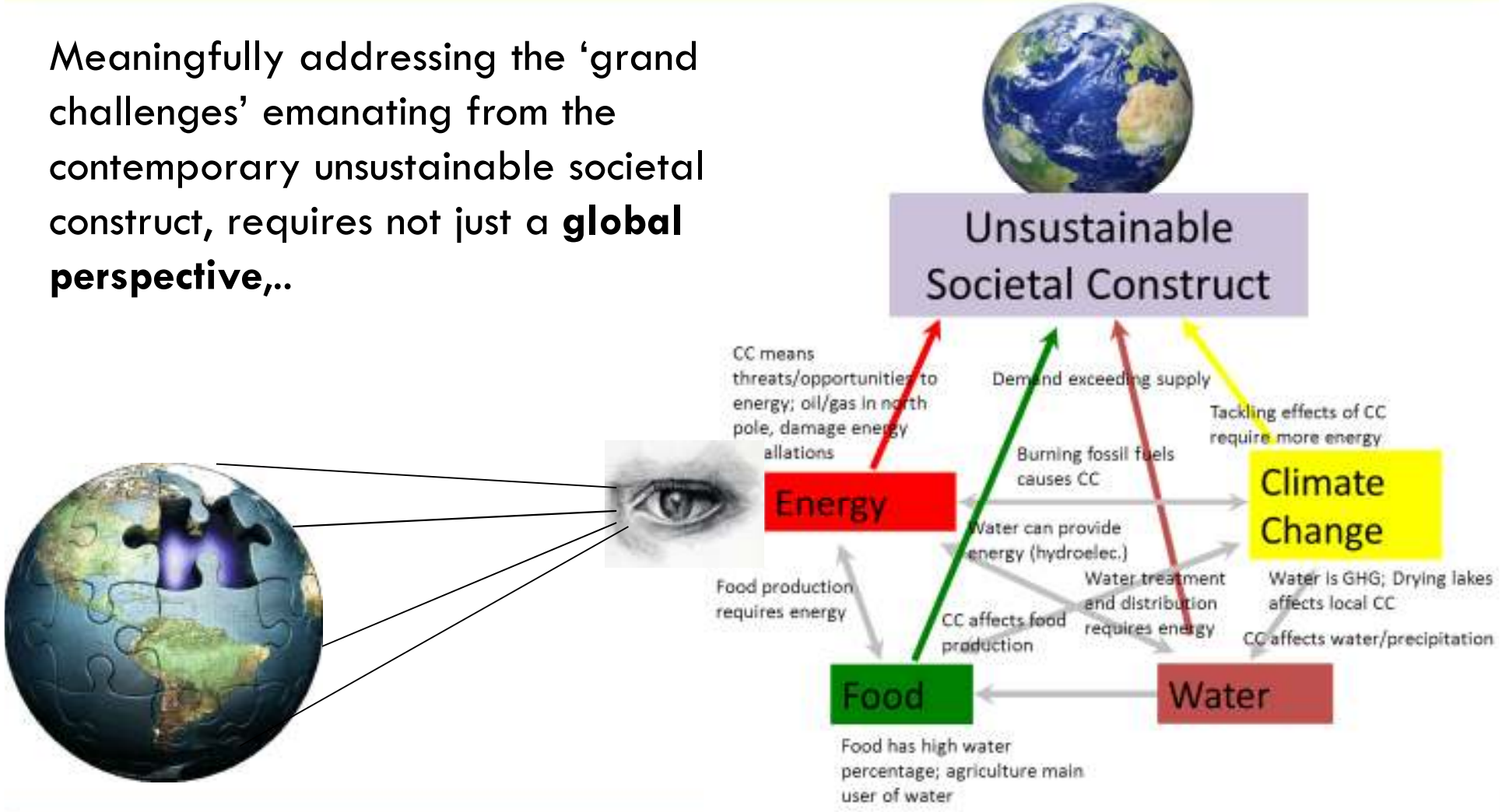


*"Literary intellectuals at one pole – at the other scientists, ..**between the two a gulf of mutual incomprehension** – sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding. They have a curious distorted image of each other. Their attitudes are so different that, even on the level of emotion, they can't find much common ground. ..**It is all destructive**. Much of it rests on **misinterpretations** which are **dangerous**."*

C.P. Snow, The Two Cultures, Rede Lecture, U. Cambridge (1959)



Meaningfully addressing the 'grand challenges' emanating from the contemporary unsustainable societal construct, requires not just a **global perspective,..**

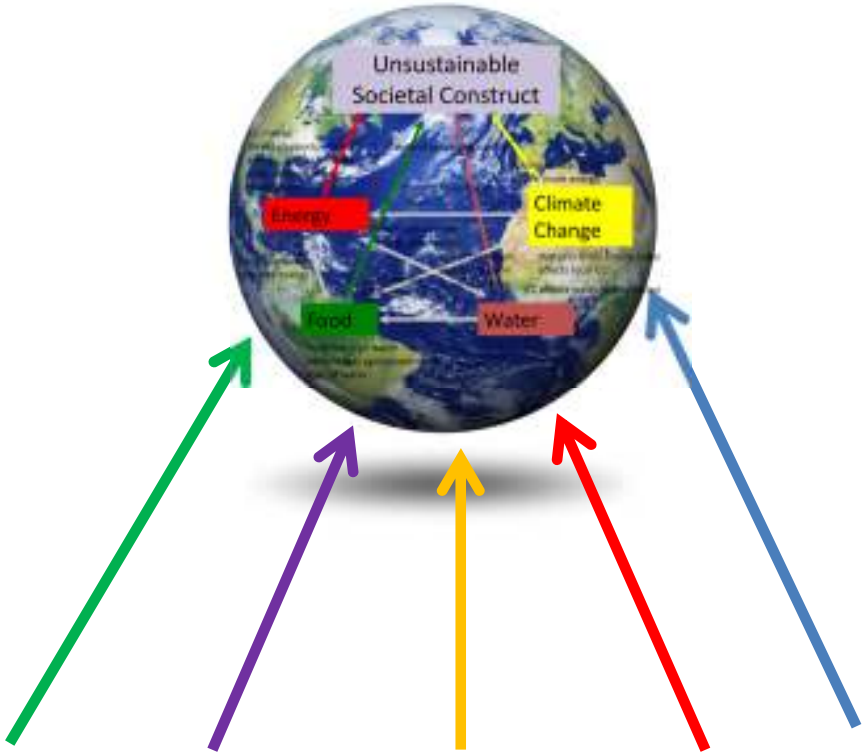




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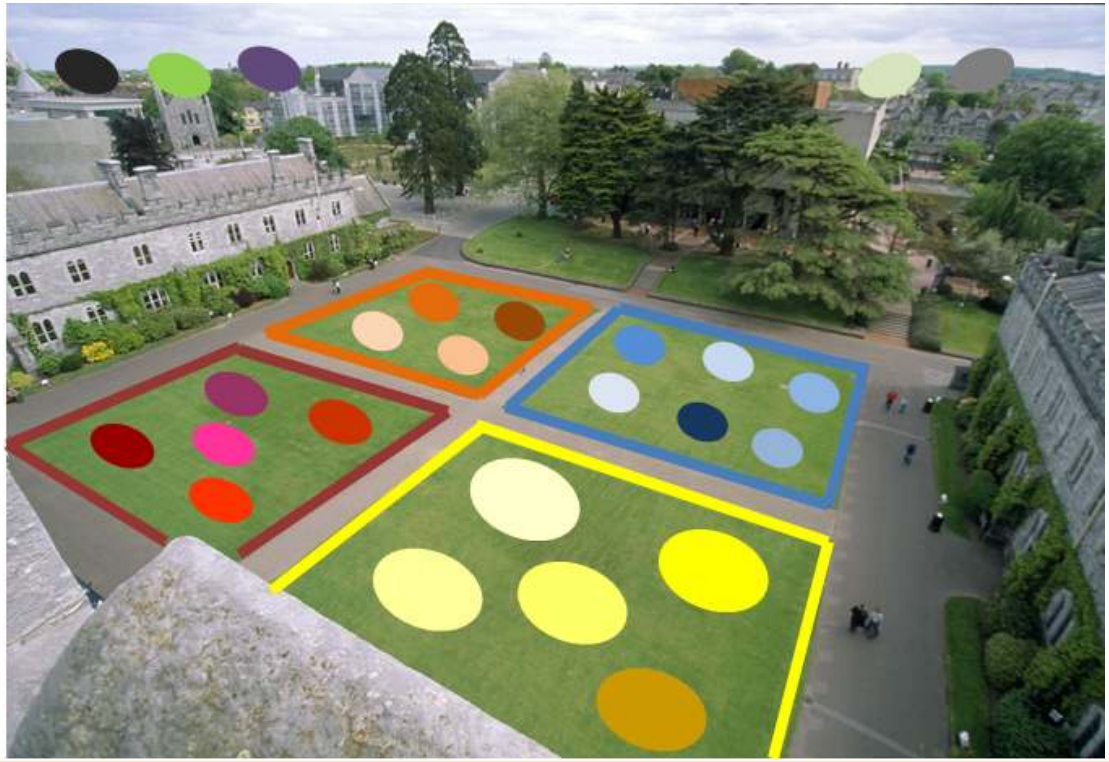
..but a **holistic non-reductive** type of knowledge that can only **emerge** through a **transdisciplinary** approach.

(Max Neef, 2005; Hirsch Hadorn et al., 2006; Nicolescu, 2012; Lang et al., 2012)





However the **siloisation** of the academy – whereby universities, as drivers of knowledge and understanding, promote increasingly specialized and ghettoised silos of knowledge, only serves to further embed a **paradigm of reduction** and **separation** (Morin, 2008).



The result?:

An educated global population (and elite) who are neither able to fully comprehend nor adequately deal with emerging crises.



The result is engineers who are incapable of seeing the **broader ethical context** of their work (nor of seeing the **rationale** for developing such an awareness), including the absence of envisioning a normative or political dimension to their work.



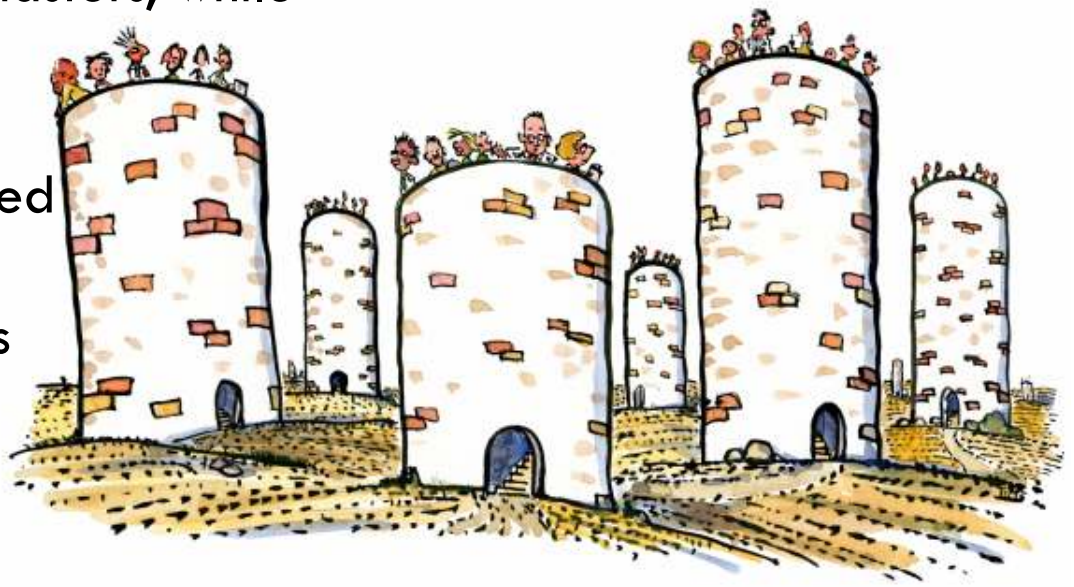




With this **limited** self-perception and toolbox, every problem can potentially be reduced to a **closed problem** with a **technological 'solution'.**



Engineers get on with the business of (literally) **constructing society,** as ordained by business or political masters, while **Social Scientists** content themselves with **exploring the nature of reality,** as (co-)constructed and mediated by humans, the interactions between human agents themselves, and at times between humans and the rest of their environment.

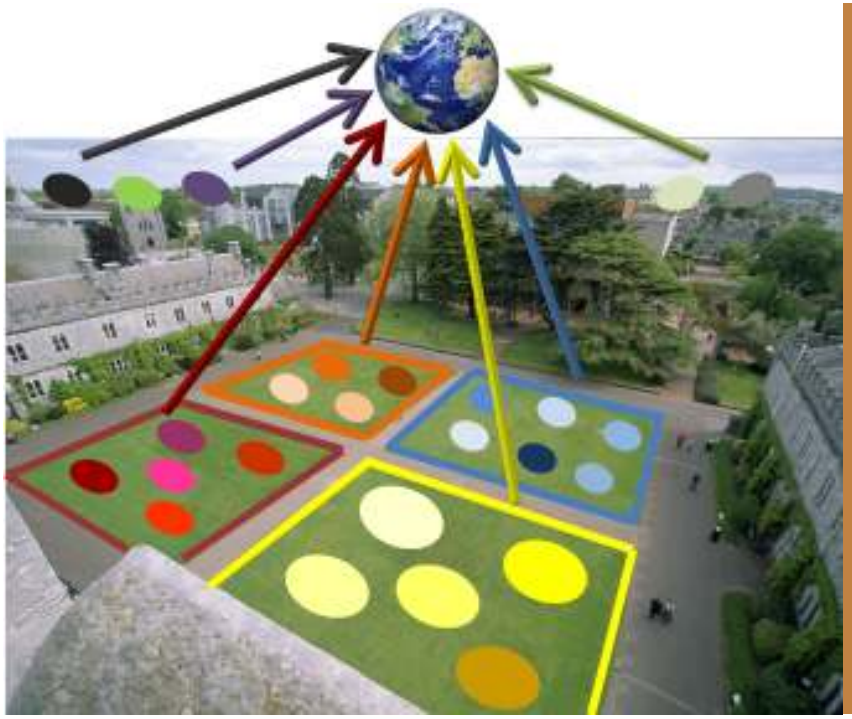


Frits Ahlefe

Yet this high level learning ('**complex thought**' (Morin, 2008)) is **not** typically **applied** to **the real techno-economic society** that **engineers help co-construct.** **Disciplinary silos** remain firmly ***in situ*** while each only sees value from within their own.



Thus, in the wake of **emerging crises**, the potential for **meaningful progress** through **transdisciplinary integration** and insight is **lost** among practitioners who not only cannot speak the same **language**, but who in many cases are incapable of even recognising the **existence** of any other.



*'We need a kind of thinking that relinks that which is **disjointed** and **compartmentalized**, that respects **diversity** as it recognises **unity**, and that tries to discern **interdependencies**.'*

(Morin, 1999)



Authors' Conclusions: **Transdisciplinary** approaches are the only **rational** and **intellectually honest** way to address emerging societal crises associated with unsustainability. Meaningful progress can only be made through **practical intervention** – at the level of professional & formative **education.**

It is unreasonable to expect disciplinary practitioners, educated exclusively in hermitically sealed silos within a 'multiversity' setting, to spontaneously develop the required understandings, skills and competences to work productively together in tackling larger wicked problems at some unspecified later stage.

The result?: Collaborative assignment involving students from two modules:

- PE3011 Sustainability in Process Engineering
- SC3029 Sociology of the Environment



	PE3011 Sustainability in Process Engineering	SC3029 Sociology of the Environment
Degree Programme:	BE (Process & Chemical)	BA
# Students:	27	7
Visiting students from:	Brazil, Germany	USA
Assignment value:	15%	0 (voluntary)
Group composition:	Groups of 3 or 4 divided among modules and nationality	
Open ended Assignment:	• Engage **collectively** to **research, reflect** and **present** on some aspect of '**Sustainability**', which through a creative fusion of disciplinary 'object world' views, might facilitate the emergence of both broader context and problem framings (sociologists?) as well as some pragmatic pointers for intervention (engineers?) alongside possible implications or difficulties. • Short **personal** (400-600 word) **reflection** on the transdisciplinary aspect of the exercise (learning opportunities, challenges, etc.)	



Formal group meetings for five consecutive weeks -lecturers present to provide feedback. A documentary was shown initially on conceptions of progress which reflected on the unsustainability of our contemporary world highlighting interlinked economic, social and ecological contexts - helped stimulate ideas and generate commonality.

Group	Chosen 'Sustainability' related topic
A	Globalisation vs Localisation
B	Consumerism - Products, Resources, Environmental & Social
C	Chocolate bars and sustainable consumption
D	Habits and their meaning for sustainable development
E	Consumerism
F	Biomimicry
G	Unforeseen and unintended consequences of sustainable development
H	Sustainability in food consumption
I	Sustainability and Ethics



The Group Presentations

Fear: **Car crash** situation among students from disparate disciplines, 'object worlds' and 'languages'.



Outcome: Overall, a great success: groups provided well researched, thought provoking presentations displaying a strong level of engagement. Lively discussions followed.

While there wasn't always a coherent narrative, students clearly engaged very well and in good faith, particularly given their different backgrounds.



Individual Reflective Reports:

(1) Provided evidence of some **strong student engagement** and **learning** during the assignment, producing some valuable insights and enhanced self-awareness.

(2) Students found the opportunity to engage with students of other disciplines to be an overwhelmingly **positive** and **intellectually stimulating/rewarding** experience.
No negative comments.



'Cultivating the T-Shaped Engineer'



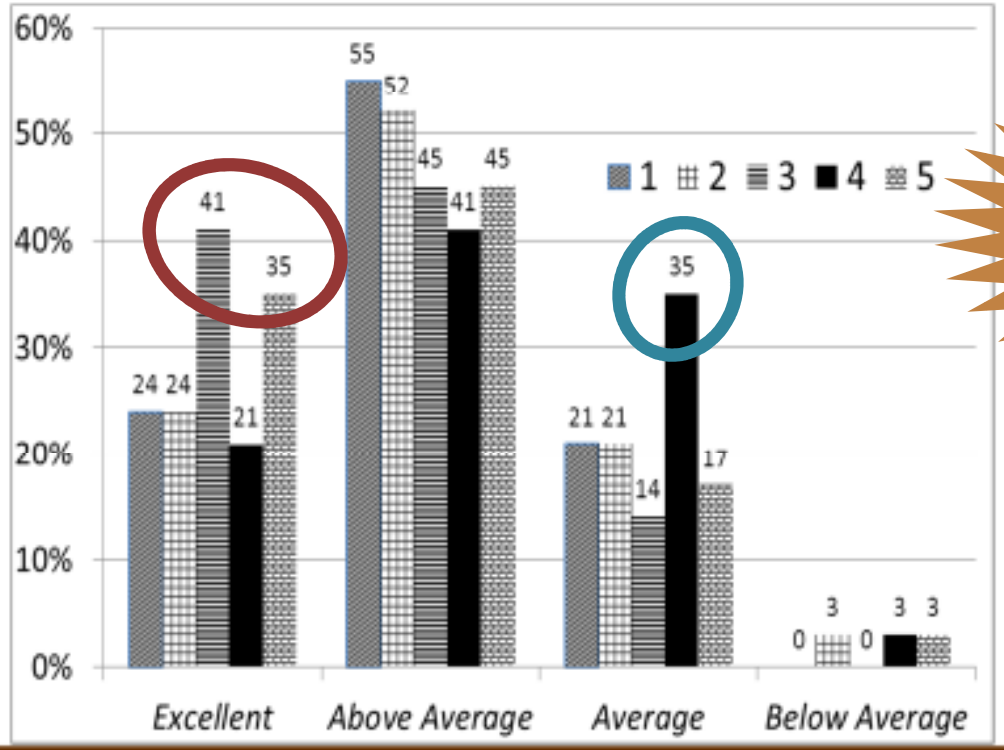
"I thoroughly enjoyed the interaction and working process of the assignment with a completely different discipline to that of chemical engineering. While different viewpoints were certainly brought up, I found that both disciplines complimented one another nicely. I found this assignment a valuable experience to my future work career not only from a sustainability perspective, but also the perspective gained from working with sociologists, i.e. a different discipline."	**Irish male engineering student (Group F)**
"Overall I really enjoyed this assignment as it was different to others encountered throughout the year. I also enjoyed working with students from another discipline; I felt that it challenged me as well as encouraging me to take on a different perspective."	**Irish female eng. student (Group C)**
"I thoroughly enjoyed this assignment. It was a great way to hear perspectives from an engineering point of view and to brainstorm what we can do together to make the world a more sustainable place. I was in awe at how much I learned from the engineers about ways they could contribute to sustainability. ..As a social work major and an activist, my favorite part of this assignment was coming up with ideas as to how we can alter our society to combat these environmental and social injustices. I have realized that we need engineers on our side. Activists can educate people extensively; but if the products are not made well, then the process is futile."	**US female sociology (Social Work major) student (Group E)**
"When it came to writing this personal reflection based on the group project undertaken by PE3011 & SC3029 students, it struck me how much I had learned about the topic we had chosen and, more importantly, a different way of thinking. As engineers, we sometimes suffer from narrow mindedness; things are black or white, right or wrong. Working with the sociologists opened my eyes to the fact that this seemingly logical way of thinking is not always the best."	**Irish male engineering student (Group A)**

'Cultivating the T-Shaped Engineer'



Key: *To what extent did this assignment help you:*

1. Develop new & deeper understandings you'd previously overlooked or help broaden your perspectives?
2. Think more critically?
3. Enhance your level of understanding around sustainability/sustainable development?
4. Better prepare you for the nature of your future career?
5. Overall, how do you think the exercise worked?



83% Response Rate



REFLECTION

- Assignment **exceeded** our **expectations** – no significant disciplinary 'language' problems, instead a willingness to learn and explore in a collaborative manner and in good faith displayed by all.

- Possibly aided by a similar spirit of **transdisciplinary openness** on behalf of **lecturers** which fostered sense of **legitimacy** among students over cynicism, quelling the potential for Snow's '*hostility and dislike, but most of all lack of understanding*' across a '*gulf of mutual incomprehension*'

- **Continued** with and **expanded** the exercise in 2014-15 (when assignment was formalised for SC3029) and thereafter



CONCLUSIONS

Despite CP Snow's misgivings, there is **significant cause for hope.**
Despite rigorous siloisation of our educational system, when disciplinarians come together in good faith its possible to have **productive transdisciplinary 'conversations'** around significant 'grand challenges' around the contemporary metaproblem of **(un)sustainability.**

Disciplinary learning and 'object worlds' are required as **pillars** from which productive transdisciplinary knowledge can both **emerge** and be **supported.**

The result: a dynamic fusion of thought and action, which rather than a nice extra, is a **prerequisite** if we **hope** to successfully **address contemporary crises** whose roots reside in **unsustainability,** and hence open up the **possibility** of genuine human **flourishing.**





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