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The disaggregated, networked and open future of education for sustainable development

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To address societal change, the authors highlight the need to incorporate new cross-cutting digital and physical spaces for learning – in and outside formal education systems – by embedding the concept of openness. They argue that this cannot be done without revisiting the global knowledge infrastructure.

Ten years prior to the "birth" of the world wide web, Lyotard (1979) had outlined a prediction for a computerised society in which knowledge and knowledge creation would be altered and transformed. Berry (2015) has recently transferred this idea into the discourse surrounding the digital transformation of contemporary societies: "The digital world is increasingly creating destabilizing amounts of dis-embedded knowledge, information and processing capabilities that undermine the enlightenment subject." While these two authors paint a rather pessimistic picture of the incorporation of digital technologies, the potential of the network society holds at the same time numerous opportunities to address the societal challenges of our time (Castells, 1996; 1997; 2000).

The curricular triangulation of sustainable, inclusive and smart growth could provide learning and cognitive as well as non-cognitive skill development opportunities to cope with destructive creation. Instead, this curricular approach could help introduce and diffuse creative destruction. In short, it could foster the innovations that make sense, nurturing responsible research and innovation that would contribute to a better and more creative use of diverse knowledge systems that can harness cultural diversity and indigenous knowledge in socially and technically inclusive ways. An integrated humanistic understanding of life and education would become possible such that the economic sustainability of profit as well

as the social and environmental sustainability of purpose would be adaptively integrated in education curricula. Before we project a future for education for sustainable development, we must first discuss the situation as we find it today.

The bounded formal curriculum of education

Despite many technological developments in the educational field, and although education is more technology-enhanced than ever before, the image of formal educational programmes and how individuals within universities engage with their curricula have remained relatively stable (Hicks, 2018). This undermines the potential of formal education to positively contribute and impact a sustainable future globally. First, under the influence of neo-liberal political economy, curricula are now often regarded as products geared towards increasing 'customer' (i.e. students) earning power in a graduate job market (Currie, 2004; May and Perry, 2013). In this demand driven definition of curricula, courses and content are often closed, which also creates a barrier to widening access to higher education (Mayes, 2014). Secondly, the majority of teaching occurs within modularised programmes where learning experiences constitute little more than fragmented, disabling cross-cohort learning. The current approach oversimplifies the complexity of real-world settings and creates unwanted distances between bodies of knowledge, disciplines and communities that could benefit from being interlinked (Savin-Baden, 2011). Thirdly, many forms of assessment results in the intellectual work of the learners remaining in the institution. If artefacts resulting from assessment are not being shared more broadly than among cohorts and academics assessing these results, the potential for these artefacts to contribute to third sector and community groups, start-ups or wider societal needs will be lost. Lastly, culture is often very narrowly defined within formal curricula. As curricula is designed according to the dominant cultural context, there is a lack of acknowledgement of and adjustment to the diverse needs within society. This results in many missed opportunities to connect learners and groups of learners from diverse backgrounds, which would create a richer learning experience and enable socially relevant learning activities to broaden the perspectives and worldviews of learners.

Disaggregated education to enable digitally distributed curricula

As we strive towards building the future of education, it is important to incorporate new spaces of learning into formal education by reframing openness in education. Embedding openness in formal educational curricula will entail going a step further than the affordances of most massive open online courses (MOOCs) and the distribution of open educational resources (OERs) as we currently know them. This step further involves the creation of co-located learning spaces that cut across physical and digital spaces that can both be inside and outside formal educational institutions. A step in this direction is put forward by Johnston, MacNeill and Smyth (2019), who propose a digitally distributed curriculum driven by the interrelated values of praxis, public pedagogy and participation. These are facilitated through the dimension's porosity, co-production, open scholarship and co-location by providing the context and conditions needed to enable a digitally distributed curriculum.

To reach this level of openness, first a disaggregation process needs to occur. This can be achieved through co-location as knowledge needs to be dislocated from institutional barriers and power contexts. The process also entails porosity as we build an educational future where digital technologies are used to facilitate the transfer of information across space and time, and to transfer locally produced solutions and knowledge into other context to serve as a solution to similar problems globally. As we foster this porosity, new ways of co-production of knowledge are enabled. Through open scholarship, community engagement can come to the forefront, so knowledge generation and mobilization can be used to overcome local and global challenges. Encouraging digital distributed curricula will help the global community learn from the local. The disaggregation process thus provides opportunities to develop human, social and cultural capital opportunities that can be utilized to raise awareness of local and global issues as well as the importance of implementing actions on both levels.

Knowledge infrastructures for education for sustainable development

Beyond disaggregating the formal curriculum, we must also emphasize the need for a global knowledge infrastructure for education to support sustainable development. As computing power gets ever more affordable, the world community as represented by the UN needs to ensure that knowledge transfer is not inhibited by infrastructure problems and vendor competition for market shares. Edwards (2010) defines knowledge infrastructures as "robust networks of people, artefacts, and institutions that generate, share, and maintain specific knowledge about the human and natural worlds." While the robustness of the networks that emerge from MOOCs and open courses might not be as stable as defined by the author, there is an opportunity to use open education not only as a one-directional medium for sharing of knowledge, but also as a channel to network and address problems in a 'glocal' (i.e. global-local) way.

Global problems are targeted on a local or regional level in the context of solving a concrete problem. Several examples of successful knowledge building and support of the creation of networks can be drawn from the literature on MOOCs (Tabuenca et al., 2019). Another challenge would be how to ensure that these open courses can produce "actionable knowledge" – i.e. knowledge that is produced and can be translated into actions (Agyris, 2003). To achieve this, the course design for MOOCs needs to focus on educational scalability (Kasch et al., 2017) while integrating learning tasks that require an application of knowledge rather than the pure transfer of factual and procedural knowledge. For the future development of technology-enhanced learning environments, we envision an environment that combines aspects of classical electronic learning environments and MOOC platforms with the functionalities of mobile apps and synchronous communication and sharing opportunities. This new environment should facilitate the immediate transfer of local innovations or solutions to any 'needs context,' enabling the recipient to then adapt and apply the solution to their local needs.

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