# TRANSFORMATIVE LEARNING AND SUSTAINABILITY EDUCATION FOR GLOBAL CO-HABITATION

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## ABSTRACT

As global societies face increasingly complex sustainability and environmental challenges, Higher Education Institutions must make appropriate changes in their policies and strategies to prepare for the demands of the future. This paper explores the potential of Design and Design Education to serve as catalysts for addressing many of the global issues currently affecting our planet. To exploit this potential, we need to transform the current educational paradigms that have been shaped by traditional discipline definitions. In pursuit of such ambitions, it is essential to shift towards learning models that enable us to create a sustainable and sustainability-focused learning ecosystem to foster a culture of reflective and informed innovation. A strong narrative is emerging from a broad base of literature around the need to shift from a tradition of disciplinarity to one of increased trans-disciplinarity. HEIs need to consider developing more relevant frameworks for coordinating and creating new disciplinary, interdisciplinary, and transdisciplinary approaches to inform both teaching and research. This paper considers the use of transformative learning as a model as it facilitates transforming existing frames of reference through critical reflection of assumptions, validating contested beliefs through discourse, acting on one's own reflective insights, and critically assessing both context and application. This paper also draws on an educational intervention in Design at Technical University Dublin to consider approaches and methods that can enable transformative learning in a transdisciplinary setting.

*Keywords: Transformative learning, trans-disciplinarity, sustainability, education policy*

## 1   INTRODUCTION

We need to find better ways of constructing and exploiting the knowledge capacity of our HEIs. The challenge is to find effective means of crossing discipline boundaries to better exploit existing discipline knowledge with an aspiration to generate an increase in transdisciplinary activity and generate new and appropriate knowledge to address the challenges of the future. Human imagination, creativity, and innovation have failed to find adequate solutions to questions of sustainability within the existing paradigm. They have been shackled by the limitations of thought by which siloed knowledge has been constrained. The potential of the collective human imagination, creativity, and innovation is vast and capable of enabling us to cohabitate sustainably with all life on our planet. Design practice and design education are potential catalysts to address many of the global climate critical issues facing us.

The frame of reference which contextualizes this paper is informed by the term 'Anthropocene'. The 'Anthropocene' is increasingly accepted as a post-Holocene epoch and is becoming a keyword in debates about contemporary environmental challenges [1]. The Anthropocene Epoch describes the most recent period in Earth's history when human activity is a powerful geological force in its own right [2] and has begun to have a significant impact on the planet's climate and ecosystems. There is increasing evidence that humans are responsible for a range of impacts on many essential planetary system parameters and that many planetary thresholds have already been crossed [3]. However, somewhere between the rhetoric and divergent positions on the Anthropocene lies the potential to evolve. The issues and challenges posed through the debate on the Anthropocene may well reframe our relationship with the rest of nature, presenting a new view of our responsibility [4] as well as stimulating our imagination to generate new solutions and actions [5]. It is from within this space of potential and possibility that we need to harness our imaginative and innovative capacities to shape a means of cohabitation with the

forces of the planet. To understand the current debates, it is crucial to distinguish between the Anthropocene in a narrow disciplinary sense, as a geological concept, and the Anthropocene as a socio-cultural concept in a wider and perhaps transdisciplinary sense. That socio-cultural concept is where the focus of discussion in this paper resides. We need to assist the forces of nature to find an equilibrium based on a partnership where co-habitation is not centred on the arrogance of human dominance [6]. It is essential that we come to terms with our interdependence on the planetary systems. However, while many will claim an intellectual comprehension of this context, there is a poor transition to action.

## 2    FROM DISCIPLINARITY TO TRANSDISCIPLINARITY

In 2014, the US National Research Council outlined the importance of convergence between disciplines as a means to addressing complex global problems arguing that real-world problems do not respect disciplinary boundaries [7]. A strong narrative emerges from the literature around the need to shift from a tradition of disciplinarity to one of increased trans-disciplinarity within both the teaching and research spaces. Gibbons argues for trans-disciplinarity as a mode of educational application for future problem-solving and elaborates on the qualitative difference it provides over disciplinarity [8]. Crossing discipline boundaries can provide knowledge flexibility to engage more comprehensively with the educational, societal, and environmental challenges with which we are increasingly faced [9]. However, we must also recognise that the knowledge that resides within disciplines does provide the foundation for complex problem-solving. Understandably, with a lack of leadership or policy in shaping the nature of new knowledge construction and management, defence of the existing realm is justified. We need a multi-dimensional approach to teaching and learning that addresses the existing limitations and enables action and strategies to construct new models of knowledge construction, dissemination, and application. McGregor suggests we need complex transdisciplinary knowledge that can be used to solve the pressing problems of humanity [10]. While there are many educational interventions in both research and teaching which bring different backgrounds and perspectives, we need to enable better solutions and a big-picture view of the problems at hand [11]. We need to transition from isolated interventions to strategic actions and become part of a more effective and integrated global Higher Education policy. Higher Education is recognised for its central role in the construction and dissemination of knowledge, traditionally through discipline-defined silos. However, this model of disciplinarity is dissolving as an appropriate means of taking on the challenges and complexity of sustainability. Sustainability is singularly the most prevailing and pervasive contemporary question facing HEIs now and into the near future. We need to find more effective ways to exploit the knowledge capacity of existing disciplines in multi- and inter-disciplinary ways with the aspiration to generate an increase in transdisciplinary activity to stimulate new and appropriate knowledge, behavior, culture, and practice to address the challenges of the future. Attempts are being made, but progress is slow, we need to act more strategically and implement policies that enable and encourage transdisciplinary innovation to occur.

## 3    TRANSFORMATIVE LEARNING THEORY – A PARADIGM SHIFT

The challenges we face in the Anthropocene require a paradigm shift in terms of existing frames of reference. To enable such a paradigm shift, we need to challenge our individual and collective views on how we relate to the world around us. Our prevailing knowledge and experience construct the traditional frames of reference by which we are individually and collectively conditioned. These frames of reference represent how we make meaning from our experience of life and are influenced by many factors including culture, beliefs, authority, etc., which we often accept and assimilate without questioning [12]. Mezirow refers to these frames of reference as habits of mind which are 'broad, abstract, orientating, habitual ways of thinking, feeling, and acting influenced by assumptions that constitute a set of codes' [13]. Without overstating the obvious, it would appear these frames have been unsuccessful in managing our impact on the biosphere. We have failed to recognise our need to co-exist in a collaborative rather than predatory manner with all elements of our bio and non-biosystem. Our disciplinary frames of reference have provided us with extraordinary success within a dominant, narrow, and exploitative context where short-term success has prevailed at an incalculable non-economic cost. In a time of unparalleled global challenges which seriously threaten the Biospheres' capacity to sustain our existence, society must pursue equally unparalleled future strategies which fundamentally require a reconsideration of established mindsets to design and follow more sustainable pathways [14].

Mezirow developed his theory on transformative learning drawing on the work of both Habermas and Dewey [15]. Transformative Learning Theory (TLT) represents a way to reposition the frame of

reference. This paper takes the position that a shift from disciplinarity to trans-disciplinarity is an essential shift in changing or transforming existing frames of reference. TLT presents the opportunity to not only change what we know or are able to do, but also to facilitate a shift in how we come to know and how we understand ourselves in relation to other humans and the natural world [16]. Transformative learning is defined as the process by which we transform conditioned frames of reference to make them more inclusive, discerning, open, reflective, and emotionally able to change [17]. The process of transformational learning facilitates changes in an individual's worldview, epistemology, self, ontology, behavior, and capacity which are evidenced in knowledge breadth and depth [18]. The process of transformative learning involves transforming existing frames of reference through critical reflection of assumptions, validating contested beliefs through discourse, acting on one's own reflective insights, and critically assessing both context and application.

## 4  HEI POLICY AND SUSTAINABILITY

Over recent decades, the Higher Education systems of many countries have substantially expanded to accommodate increased demand. It has become clear that HEIs are confronted with growing challenges in the face of globalisation, internationalization, and massification. Globalisation and the development of knowledge-based economies have affected changes in the character and functions of education throughout the world [19]. To remain relevant, HEIs require new kinds of strategic thinking and acting with regard to this international dimension [20]. Future-proofing HEIs requires us to be willing to do new things and to think outside the box. Differences between economic and social imperatives challenge the moral and ethical integrity and relevance of HEIs in the 21$^{st}$ century [21]. A lack of coordinated policy inhibits maximizing the potential of these institutions and generally involves a multiplicity of actors, with different agendas, often resulting in fragmented actions. In Ireland, for example, policy is informed by the Department of Education and the Higher Education Authority, which are in turn informed by the European Commission, the OECD, and UNESCO to varying degrees. However, in addition to the changing landscape which challenges the sustainability of the university in its current form, we are also faced with the challenges to human sustainability and the destruction of the biosphere. Sustainable Development Goals (SDGs) and Shared Socio-economic Pathways (SSPs), illuminate the challenges. We need coordinated policy to enable appropriate action.

Sustainability is singularly the most prevailing and pervasive contemporary question facing HEIs now and into the near future. For HEIs, this involves addressing questions around 'sustainability of education' and 'education for sustainability'. While 'sustainability of education' and 'education for sustainability' may appear to be different strategy and policy issues, this paper positions them as dynamically interlinked. We need to educate for a sustainable future in which our HEIs are relevant and consequently sustainable [22]. To future-proof our HEIs we need to look at how we do what we do. [23]. UNESCOs *2009 Trends in Global Higher Education* reminds us that "the role of higher education as a public good continues to be fundamentally important and must be supported" [24]. The importance of education as a means to meet the challenges of the future is acknowledged broadly. Evans argues that "*We urgently need education that confronts the challenges of our time*" [25]. Findler et al., argue that HEIs are "transformative societal agents that can contribute decisively to the development of sustainable societies" [26], acknowledging that a variety of global initiatives, already recognize the important role HEIs can play in this transformation. UNESCO emphasises this role arguing that "education is the most effective means that society possesses for confronting the challenges of the future" [27].

In terms of maintaining relevance, there is a strong imperative for HEIs to develop a strategic or policy position on the manner in which they address the management of new knowledge construction as well as its dissemination and application, both in teaching and research. Such action could assist in future-proofing the position of HEIs as the primary catalyst in addressing the increasingly demanding and complex problems of a stressed planet. HEIs may need to consider developing a relevant framework for coordinating and creating new disciplinary, interdisciplinary, and transdisciplinary approaches to inform teaching. [28]. An opportunity exists for Higher Education policy to recognize the value and power of the transdisciplinary potential of the collective knowledge resources at our disposal and enable a more structured and less ad-hoc development and exploitation of this potential. Cortese argues that the issues facing us now and into the future cross over disciplinary boundaries, "*Designing a sustainable human future requires a paradigm shift towards a systemic perspective emphasizing collaboration and cooperation*" [29]. However, its increasingly evident that institutional and higher education policy barriers as well as external environmental challenges are not being met with appropriate urgency.

# 5 EDUCATIONAL INTERVENTION – CASE OUTLINE

Through transdisciplinary engagement, Design has the potential to be a catalyst for taking on the challenges of a disruptive age. This paper draws on observations from a BSc Product Design run at Technical University Dublin. This program is a collaboration between three separate Schools, located within three different Faculties at the University. From its inception, a key objective was to provide students with the opportunity to engage with Business, Engineering, and Design and to immerse them in the culture of these different disciplinary areas. While there have been challenges involved in working across discipline 'tribes', the program has successfully negotiated these challenges and continues to move towards being transdisciplinary in philosophy and practice. It should be noted that the reference to this educational intervention is a demonstration of practice action in pursuit of transformative identity construction. Its effectiveness and impact are the subject of current research and will be reported on in future conference proceedings.

An example of a transdisciplinary/transformative approach is focused on a fourth-year Professional Practice module that uses a flipped classroom format to enable transformative learning. There is a comprehensive literature outlining the benefits of the flipped classroom approach in facilitating both experiential learning and the active construction of knowledge for participating students [30]. The students can build on their understanding of concepts through negotiation and discussion with other members of the class, including the tutor, and learn in a collaborative and socially constructed manner. Deep learning and the construction of knowledge are facilitated when individuals have the opportunity to actively engage with the subject matter as well as with other individuals [31]. This module aims to encourage and enable critical thinking and deep learning, both of which are essential elements of Transformative Learning Theory [32]. An important feature of the flipped classroom concept is pre-class preparation. Reading or video materials are sent ahead of the class. The extent of the materials for review is carefully curated in terms of both quality and quantity to ensure that the students are not overwhelmed by the materials and feel comfortable engaging with them. Over the course of the module, the students revisit and contextualize a variety of subjects and debate their interconnectedness. They debate issues of sustainability, ethics, design responsibility, intellectual property, entrepreneurship, contracts, and design management.

A café metaphor is used as a vehicle for the modules' physical and online presence. The transformation of the classroom into a café is both metaphoric and educationally responsive. While the café is still an artificial construct, it acts as a means to temporarily remove the students from the traditional classroom and simulate an altered reality that is conducive to rich discourse and debate. The 'cafe' session concept is metaphorically modelled on the cafe culture of the 19th century, where intellectuals, radicals, and artists could meet and debate. The café discussions or debates are loosely based on Problem-Based Learning (PBL). PBL is an instructional method in which students learn by solving problems and reflecting on their experiences [33]. PBL works because it encourages the activation of prior knowledge in the small group setting and provides opportunities for elaboration on that knowledge [34]. PBL, in the café sessions, centres around questions that are posed to the students as part of the café 'menu'. This requires them to address aspects of the materials which they have studied and discuss and negotiate an agreed solution or perspective in response to the questions asked. This provides a distinct form of active learning which is based on constructivist theories. The student plays the role of the constructor of information and takes an active role in the broader learning construction [35][36]. The nature of the 'café' classroom environment also allows the lecturer to interject in the different table discussions and contribute with appropriate practice anecdotes specific to the deliberations of the table. Anecdotes are particularly appropriate in a module on professional practice where there is limited real-world experience available to the students. Pringle & Smith encourage a shift towards using lived experiences and anecdotes as a foundation for teaching, arguing that this approach could support students to engage with the emotional, ethical, and spiritual aspects of the issues being discussed, rather than focusing solely on the intellectual aspects [37].

Each week students write a short reflective piece on their own learning in response to the materials they reviewed and the classroom discussions in the café session which captures their own learning journey. The rationale for engaging in reflection on learning is influenced by Dewey's [38] seminal work on reflection in education and the reflective practitioner. The act of reflection encourages deep learning approaches that are essential to enhance student knowledge [39]. Through both the discussions and the reflections the students are encouraged to question their existing frames of reference which culminates in them producing and presenting a personal 'Design Manifesto' to articulate their position.

Students are also encouraged to make recommendations on any aspect of the module that they feel could be improved, both at a micro and macro level. This provides students with a sense of ownership of the module. This element acts as a form of co-creation providing students with an opportunity to influence the content and structure of the module on an ongoing basis [40]. It also provides the lecturer with rich insights into the effectiveness of the teaching. Further research on this module is ongoing and will be presented at future conferences where the experience of the students will be captured.

## 6   CONCLUSIONS

This paper has outlined the prevailing contextual issues and provided an example of addressing them on the ground. Responsible innovation is an essential condition of a sustainable future. Design education is a potential catalyst to address many of the global issues facing the planet at this point in time. In pursuit of responsible innovation, we need to transform the current educational paradigms that have been shaped by traditional discipline definitions. This paper outlines the potential of Transformative Learning Theory as a catalyst for radically transforming the discipline order of higher education and re-orienting it into a more appropriate transdisciplinary innovation matrix. We need to cultivate transformation in the very way our institutions facilitate and enable the future of learning in an increasingly unstable natural ecosystem. If we want to transform teaching and learning, we need to transform policy. When policy is focused primarily on a research agenda and supported by funding streams with narrow agendas we will continue to fail to achieve our ambitious goals in terms of sustainability education. The challenges we face are substantial. We need a paradigm shift in education to take on these challenges. Design is a field with the means to enable transformative shifts in thinking and acting. That is its purpose from the first stone our ancestors shaped into a tool. We have the proven capacity to impact and shape our environment. What have we learned? Ignorance and irresponsible human-centric motivation in the shaping of our environment has brought us to the brink of being unsustainable.

## REFERENCES
[1]   Crutzen P. J. and Stoermer E. F. 2000. The "Anthropocene." *Global Change Newsletter* 2000, 41, 17-18.
[2]   Crutzen P. J. Geology of mankind. *Nature*, 2002, 415(3), 23-23.
[3]   Bińczyk E. The most unique discussion of the 21st century? The debate on the Anthropocene pictured in seven points. *The Anthropocene Review*, 2019, 6(1-2), 3-18.
[4]   Berkhout F. Anthropocene futures. *The Anthropocene Review*, 2014, 1(2), 154-159.
[5]   Bińczyk E. The most unique discussion of the 21st century? The debate on the Anthropocene pictured in seven points. *The Anthropocene Review*, 2019, 6(1-2), 3-18.
[6]   Syvitski J. Anthropocene: An epoch of our making. *Global Change*, 2015, 78.
[7]   National Research Council (NRC) *Convergence: Facilitating transdisciplinary integration of life sciences, physical sciences, engineering, and beyond.* 2014, (The National Academies Press, Washington DC).
[8]   Gibbons M. *Higher Education Relevance in the 21st Century*. 1998, United Nations Educational, Scientific and Cultural Organization. (p.7)
[9]   Mossman A. P. Retrofitting the ivory tower: Engaging global sustainability challenges through interdisciplinary problem-oriented education, research, and partnerships in US higher education. *Journal of Higher Education Outreach and Engagement*, 2018, 22(1), 35-60.
[10]  McGregor S. L. T. *Place and Transdisciplinarity*. 2012, In Mullally G., Byrne E. and Sage, C. Disciplines, perspectives and conversations. In Transdisciplinary Perspectives on Transitions to Sustainability 2016, 21-40 (Abingdon: Routledge).
[11]  Aktas C. Reflections on interdisciplinary sustainability research with undergraduate students, *International Journal of Sustainability in Higher Education*, 2015,16 (3), 354-366. (p.1).
[12]  Anand T. S., Anand S. V., Welch M., Marsick V. J. and Langer A. Overview of transformative learning I: theory and its evolution. *Reflective Practice*. 2020, 21(6),732-43.
[13]  Mezirow J. Transformative learning: theory to practice, *New Directions for Adult and Continuing Education*, 1997, Vol. No. 74, 5-12., (pp.5-6)
[14]  Urmetzer S., Lask J., Vargas-Carpintero R. and Pyka A. Learning to change: Transformative knowledge for building a sustainable bioeconomy. 2020, *Ecological Economics*, 167,
[15]  Mezirow J. Transformation theory and cultural context: a reply to Clark and Wilson, *Adult Education Quarterly*, 1991, 41(3), 188-192.

[16] Mezirow J. Transformation theory and cultural context: a reply to Clark and Wilson, *Adult Education Quarterly*, 1991, 41(3), 188-192.

[17] Mezirow J. An overview on transformative learning. *Lifelong learning*, 2008, 40-54. (p.92).

[18] Hoggan C. A typology of transformation: Reviewing the transformative learning literature. *Studies in the Education of Adults*, 2016, 48(1), 65-82.

[19] Mok K. H. Massification of higher education, graduate employment and social mobility in the Greater China region. *British Journal of Sociology of Education*. 2016, 37(1), 51-71.

[20] Altbach P. G., Reisberg L. and Rumbley L. E. *Trends in Global Higher Education: Tracking an Academic Revolution*. 2009 (Paris: UNESCO).

[21] Arvanitakis J. and Hornsby D. J. *Are universities redundant? In Universities, the citizen scholar and the future of higher education* 2016, 7-20. (Palgrave Macmillan, London).

[22] UNESCO *Educating for a sustainable future: a transdisciplinary vision for concerted action.* 1997, (United Nations Educational, Scientific and Cultural Organization).

[23] Arvanitakis J. and Hornsby D. J. *Are universities redundant? In Universities, the citizen scholar and the future of higher education* 2016, 7-20. (Palgrave Macmillan, London).

[24] Altbach P. G., Reisberg L. and Rumbley L. E. *Trends in Global Higher Education: Tracking an Academic Revolution*. 2009 (Paris: UNESCO). p.18.

[25] Evans T. L. Transdisciplinary collaborations for sustainability education: Institutional and intragroup challenges and opportunities. *Policy Futures in Education*, 2015, 13(1), 70-96. (p.71).

[26] Findler F., Schönherr N. and Martinuzzi A. *Higher Education Institutions as Transformative Agents for a Sustainable Society*. In Chancen und Grenzen der Nachhaltigkeits transformation, 2019, 95-106 (Springer Gabler, Wiesbaden).

[27] UNESCO *Educating for a sustainable future: a transdisciplinary vision for concerted action*. 1997, (United Nations Educational, Scientific and Cultural Organization).

[28] Becker S. A., Brown M., Dahlstrom E., Davis A., DePaul K., Diaz V. and Pomerantz J. *NMC horizon report: 2018 higher education edition*. 2018, (Louisville, CO: EDUCAUSE).

[29] Cortese A. D. The critical role of higher education in creating a sustainable future. *Planning for higher education*, 2003, 31(3), 15-22. (p.16).

[30] Bredow C. A., Roehling P. V., Knorp A. J. and Sweet A. M. To flip or not to flip? A meta-analysis of the efficacy of flipped learning in higher education. *Review of educational research*, 2021, 91(6), 878-918

[31] Arthurs L. A. and Kreager B. Z. An integrative review of in-class activities that enable active learning in college science classroom settings. *International Journal of Science Education*. 2017, 2073-91.

[32] Thomas I. Critical thinking, transformative learning, sustainable education, and problem-based learning in universities. *Journal of Transformative Education*, 2009, 7(3), 245-264.

[33] Barrows H. S. and Tamblyn R. M. Problem-based learning: An approach to medical education 1980, Vol. 1. (Springer Publishing Company).

[34] Schmidt H. G., Rotgans, J. I. and Yew E. H. The process of problem-based learning: what works and why. *Medical education*, 2011, 45(8), 792-806.

[35] Piaget J. *On the Development of Memory and Identity*, 1968, 2nd Ed. (Barre, MA: Clark University Press).

[36] Vygotsky L. S. *Mind in Society: The Development of Higher Psychological Processes*. 1978, (Cambridge, MA: Harvard University Press)

[37] Pringle A. and Smith M. Using lived experience stories and anecdotes to enhance mental health nurse education. *Mental Health Practice*, 2022, 25(1).

[38] Dewey J. *How We Think: a restatement of the relation of reflective thinking to the educative process*, 1933, 2nd Ed, (New York: D. C. Heath & Co.)

[39] Tsingos C., Bosnic-Anticevich S. and Smith L. Learning styles and approaches: Can reflective strategies encourage deep learning? *Currents in Pharmacy Teaching and Learning*, 2015, 7(4), 492-504.

[40] Taylor C. and Robinson C. Student voice: Theorising power and participation. *Pedagogy, Culture & Society*, 17(2), 2009, 161-175.