



The Design Journal

An International Journal for All Aspects of Design

ISSN: 1460-6925 (Print) 1756-3062 (Online) Journal homepage: <http://www.tandfonline.com/loi/rfdj20>

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To cite this article: Nikolas Winter-Simat, Natalie Wright & Jaz Hee-jeong Choi (2017) Creating 21st Century Global Citizens. A design-led systems approach to transformative secondary education for sustainability, The Design Journal, 20:sup1, S1651-S1661, DOI: [10.1080/14606925.2017.1352688](https://doi.org/10.1080/14606925.2017.1352688)

To link to this article: <https://doi.org/10.1080/14606925.2017.1352688>



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Published online: 06 Sep 2017.



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Creating 21st Century Global Citizens.

A design-led systems approach to transformative secondary education for sustainability

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Abstract: In order to minimize the life threatening ecological impacts of human actions there is an urgent need for education to prioritize personal and societal transformation as one of its central purposes. The broad fundamental and systemic changes required are not well understood, nor is there substantial research identifying how secondary schools and teachers can implement new responsive pedagogical frameworks at a grass roots level. This paper presents an emerging research agenda looking at how design-led and whole systems thinking approaches to learning, applied within a holistic ecocentric learning paradigm, can be used to promote transformative learning towards active global citizenship and global sustainability within an Australian independent school context.

Keywords: Global Citizenship, Design Thinking, Transformative Learning, Sustainable Secondary Education, Systems Thinking

1. Introduction

As a result of human actions, several of the Earth's major life systems are under threat of irreversible and abrupt changes that could be disastrous for all life (Rockstrom 2009). One of the key challenges in facing this complex and critical crisis is addressing education's role in the "epidemic failures in individual human development" (Plotkin 2008), and trialling new frameworks for systemic change to assist individuals to develop sustainability mindsets and global citizenship. Although there are emerging initiatives around the world to align education with the perceived needs of the 21st century, two major problems arise. First, the conflicting structures and values of the existing education paradigm will limit their effectiveness. Further, as long as the dominant educational paradigm remains embedded and complicit with a market driven and mechanistic dominant culture,

it will struggle to promote change to a system in which it is invested. Second, preparing young people for a future based on the progression of the current unsustainable economic paradigm only furthers ecological crises. This research is based on the premise that education, through design approaches, can prioritize holistic learning and development that helps young people develop the competencies and values they need to both thrive in the present and influence and co-create a more sustainable future.

Global citizenship and sustainability are now listed as values and desired outcomes of most education systems including the Australian National Curriculum, yet little research exists on the learning environment and teaching approaches in which these can be effectively developed. This paper will identify the defining characteristics of Global Citizenship, the need for a transformative learning paradigm, and the importance a design-led and whole systems learning approach. Finally, a pilot study applying concepts addressed in this paper is outlined as well as an action research methodology, conclusions and implications.

2. Global Citizenship

Global citizenship represents the knowledge, competencies, values, and attitudes that develop a global awareness and the human agency that empowers local and global action towards a more peaceful, equitable, and sustainable world (UNESCO, 2014; Reade et al, 2013). Goleman, Bennett, & Barlow (2012) stress the importance of teachers' role in helping young people develop an ecological intelligence that is crucial for 21st century sustainability. Reade et al (2013) highlight the need for leadership skills and an understanding of global complexity and interconnectedness.

Table 1. Global citizenship definition

A Global Citizen...	
Engages in learning and the personal development of ethics	Is a flexible, creative, critical, and proactive thinker
Employs systems thinking when considering sustainability and the common good in decision making	Has empathy towards all life
Works well collaboratively and inter-culturally to solve problems locally and globally	Is curious about, values, and belongs to the more than human world

Table 1 combines these ideas with concepts from the well known Oxfam (2015) and UN global education first (Ki-Moon, 2012) definitions. The resulting 6 basic characteristics of global citizenship will be used to guide the design process and data analysis of this research project.

These broad global citizenship capabilities embedded within the dominant education model, generally result in accommodation to market driven educational goals rather than more transformational outcomes (Sterling, 2001, p.14). Understood as socially learned and nurtured behaviors however, global citizenship requires a transformative learning framework within a supportive learning community. Transformative learning theory highlights the importance of experiences that conflict with current points of view, critical reflection, and rational discourse

(Mezirow, 2000). In particular, this process should be student-centered and project-based, including significant places (Singleton, 2015), encounters with wild nature (Plotkin, 2008, p.138) a diverse learning community, and thoughtfully designed environments and technologies. Design, broadly understood as an approach to understanding complex systems, framing ill-defined problems, and taking empathic iterative action, presents as an ideal project-based framework for the transformative learning required in the development of global citizenship.

3. Towards a Transformative Ecocentric Learning Paradigm

3.1 Purpose of Education

The purpose of education and its impact on learners and society has been long debated and is at the heart of the work of educationalists such as Rudolph Steiner, John Dewey and Maria Montessori. The learning paradigm in which a school or education system operates can be identified by looking at the agreed upon values, priorities, and purposes of education. Sterling (2001) identifies four main functions of education. The first three (or versions of them) often compete within most current dominant learning paradigms. It is the fourth, which, in practice incorporates the other three, that represents the transformative ecocentric learning paradigm needed to promote global citizenship and holistic 21st century learning.

1. Social: To replicate society and culture and promote citizenship.
2. Vocational: To train people for employment.
3. Personal: To develop the individual and their potential.
4. Transformative: To encourage change towards a fairer society and better world (Sterling, 2001, p.25).

If education is to help develop whole healthy individuals, **global citizens** who practice sustainability as a part of their values (O'Sullivan 1999), then it must prioritize personal and societal transformation. A transformative learning paradigm, rather than being a competing function of education, includes and incorporates social, vocational and personal development holistically.

Many schools practice a highly transmissive model of education because of the pressure for homogeneity in the name of accountability, or a focus on a narrow set of cognitive skills due to competitiveness around standardized tests. Other schools develop a vocational training focus and become closely allied to industry which, without a holistic approach, end up simply producing employees for a broken economic system and meeting the needs of the globalized marketplace (O'Sullivan, 1999). Without an overarching transformative purpose, education is easily influenced or even co-opted by interest groups such as governments and industries whose interests rarely extend beyond their political or economic borders.

3.2 21st Century Learning

21st century learning encompasses the skills, competencies, mindsets and attitudes that current industries, educationalists and academic institutions have identified as highly valuable to success in work and life in the 21st century (Trilling & Fadel, 2009). Some common themes include communication and collaboration within a diverse team, creative problem solving and innovation, critical thinking, design and innovation, digital literacy, and flexibility and adaptability (Friedman, 2008; Florida, 2005; Partnership for 21st Century Learning, 2009). Similar to global citizenship

education, due to the limited capacity of traditional education approaches to develop these skills and competencies, design-based learning has been identified and recommended as integrative and effective approach by many researchers.

However, the assumption in the majority of the rhetoric surrounding 21st century learning is that education's purpose is to prepare learners to participate and succeed in the perceived formal (knowledge) economy of the future, which in its current trajectory remains an unsustainable economic model of consumption and development. As most industries are not operating within the recognized boundaries of the Earth's capacity to sustain life long term, 'succeeding in contemporary careers and workplaces' (The Partnership for 21st Century Skills, 2009) without transforming them is currently at odds with life on Earth as we know it.

Trilling & Fadel (2009) assert that the role of education in the 21st century is to contribute to work and society, fulfill personal talents and civic responsibilities, and carry forward traditions and values. The personal and societal transformative function of education is largely ignored. Keri Facer (2011) also identifies this current lack of public debate regarding the purpose of education asserting that "we should also conceive of education as a primary motor for shaping social values, . . . rather than as a servant of society, laggardly following on behind wherever socio-technical change might lead" (Facer, 2011, p. 9).

If education is to play a part in developing a culture of sustainable practices, then it cannot simply equip young people with 21st century skills and knowledge and hope they use these for the greater good. *Education must prioritize the development of values, ethics, and a participatory worldview that will enable young people to innovate, reinvent, or transform the practices, industries and even cultures in which they live and work.*

3.3 Australian Context

In Australia, the Department of Education and Training states that the purpose of education is "to ensure Australia's future prosperity and to remain competitive internationally" (Department of Education and Training, 2016). Interestingly, the Melbourne Declaration claims that education should produce successful learners, confident and creative individuals, and active and informed citizens while promoting equity and excellence (MCEETYA, 2008). Therefore, although global citizenship is identified in the National Curriculum's cross curriculum priorities, the dominant learning paradigm in Australia from a policy point of view is primarily based on the first two functions of education (social and vocational), occasionally incorporating the third (personal). This, as well as managerialist and assessment-focused structures, create a pedagogical environment that limits schools and teachers in their ability to develop and apply transformative learning practices.

Despite this, innovative design-based projects are emerging outside of curriculum constraints. Design Minds, an online design learning platform provides resources for creative learning and design skill development (Duel, Wright, & Roxburgh, 2014). Jump Start, a project-based, design thinking and social entrepreneurship program offers 12 week workshops in schools. At a state level the Queensland Design Strategy 2020 has led to the development of numerous design initiatives prioritizing sustainability, including those within education and community learning. Independent schools and special assistance schools, which allow more flexibility in the design and delivery of curriculum, are increasing in number and often incorporate more creative approaches to education. It is in this sector that the research project introduced in this paper will be conducted with a view to contribute to the growing body of work supporting design approaches to education, and introduce a transformative ecocentric learning paradigm in which to situate those approaches.

3.4 Ecocentric Learning Paradigm for the 21st Century

A *transformative ecocentric learning paradigm* does not neglect core subjects or students' social, intellectual, cultural, vocational, and personal development, but teaches them in an integrated way that places humans as participants within the Earth's interconnected and interdependent ecological community (O'Sullivan, 1999). In contrast to a knowledge and skill focused learning paradigm, ecocentric learning offers a more natural and contextual way of learning. It promotes the application of skills and knowledge towards the development empathy, understanding and wisdom. Sterling (2001) identifies three dimensions that would need to shift from mechanistic thinking to ecological thinking.

The **Perceptual Dimension** can be understood as the development of empathy through a shift from individualistic thinking to interdependent thinking where the interconnectedness of all things is acknowledged and honored and the impact of actions recognized. This can be developed through exposure to new ways of thinking and seeing the world and through encounters with diversity.

The **Conceptual Dimension** can be understood as the development of understanding through a relational view of the world and valuing and respecting the whole biotic community. This can be developed through interaction and connection with otherness, beauty, and wild nature.

Practice Dimension can be understood as the development of the wisdom to translate experiences and understanding into a more sustainable life and worldview. This is best achieved through involvement with open, playful, creative, collaborative, meaningful, and holistic projects (Sterling, 2001, p.53).

Table 2 highlights examples of some of the perspectives found within the current dominant cultural paradigm in contrast to those in an ecocentric learning paradigm.

Table 2. Movement towards a sustainable ecocentric learning paradigm

From Dominant Paradigm	To Ecocentric Paradigm
Human independence	Global interdependence
Isolated actions and events	Universe operating as a seamless integral whole
Fragmented areas of learning	All learning as interdisciplinary and interconnected
Earth as a human resource	Earth as a complex community
Humans (self) as pre-eminent and of higher value than the rest of the biotic community	A web of life perspective where humans are a part of a more than human world.
First order learning (formative)	Second and third order learning (formative and transformative)
Dominate / compete	Participate / collaborate
Control and command	Consult and consent

The following section presents how design and whole systems thinking, taken together and situated within an ecocentric learning paradigm, can be a powerful learning approach and contribute to sustainability and the development of global citizenship.

4. Design-Led Systems Approaches to Learning

4.1 Design Thinking

The way in which many designers think and approach tricky and poorly defined problems, known as **design thinking**, involves processes such as divergent thinking and abductive reasoning (Cross, 2006). It is a human-centered, multi-solution focused, iterative, and optimistic approach. Importantly, design thinking focuses on a changed or improved future rather than just a solved problem. According to Carroll (2015),

“Design thinking, with its focus on empowerment and agency, is a powerful tool to meet the needs of 21st century learners by providing a human-centered scaffold for problem definition and problem solving. Students need to know how to be empathetic towards others, identify problems, and generate creative solutions” (Carroll, 2015, p.62).

As a component of general education therefore, design thinking has the potential to help young people move from being passive to active learners and develop creative and critical thinking skills, resourceful optimism, motivation, morality and citizenship (Design Commission, 2011; Design Council, 2011). In their development of the concept of mindshifts, Goldman et al. (2012) observe that design thinking leads to changes and developments in young peoples’ resilience, empathy, approaches to problem solving and new challenges, worldviews, and epistemological viewpoints. These design thinking capacities show a natural overlap connecting a transformative learning paradigm with global citizenship education.

Design as an action naturally includes systems thinking as an organizing element, but unless designers apply systems thinking holistically, their work will not be sustainable (Nelson & Stolterman, 2003). Similar to the problem discussed earlier with 21st century skills, when design thinking is applied within the current market-driven economic framework or taught within the dominant education paradigm, its capacity to be transformative and systemic is limited. For example, design thinking has been referred to as human-centered and a key to living well (Koh, 2015). Although this is vastly improved from design approaches centered on innovation or profit, the needs, interests and inherent value of the more than human world can be ignored. When applied through a **whole systems thinking** lens and a participatory worldview design thinking can shift from being a human-centered approach to a broader more inclusive **ecocentric approach**.

4.2 Whole Systems Thinking

Whole systems thinking applied in schools helps young people understand the complex web of connections throughout the world. Engaging complexity encourages students to think in terms of relationships, connectedness, and context rather than fragmented topics, separate disciplines, and linear reductionistic actions (Center for Ecoliteracy, 2012; Plotkin, 2008). This awareness of the world as a web of connected complex adaptive systems in which they participate rather than manipulate or dominate, develops an ecological intelligence that can lead students to a broader worldview and more sustainable lifestyles (Golman, Bennett, & Barlow, 2012). Therefore, whole systems thinking has the capability to ground design thinkers in finding balanced outcomes that consider both the

integration of different schools of thought and the wide-reaching implications of their actions in an inherently complex and increasingly globally interconnected world.

The combination of design thinking and whole systems thinking within the context of this research will be termed **design-led systems approach** and defined as: *a teaching and learning approach that addresses meaningful and relevant problems through the application of design thinking skills and strategies within an understanding of the world as a highly interconnected emergent network of interdependent complex adaptive systems*. In this light, learners are introduced to a cosmology of interdependence, planetary consciousness, belonging and participation that can directly impact their way of creatively working with real and relevant complex problems as insiders and influential members of the more than human world.

5. Research

5.1 Research Gaps and Objectives

The literature reviewed and ideas presented within this paper highlight the need for:

- A clearer understanding of global citizenship, how it is developed and its relationship to global sustainability in the 21st century.
- The framing of a broader purpose of education to lead innovation in light of the documented consequences of the current economic trajectory (i.e. globalization, environmental degradation, climate change).
- Empirical data on the application of design as a transdisciplinary framework within education.

To address these gaps in current research the following questions, methods, and approaches will inform the design of a pilot study to generate data to further develop an action research project to be held within an Australian independent school.

5.2 Research Questions

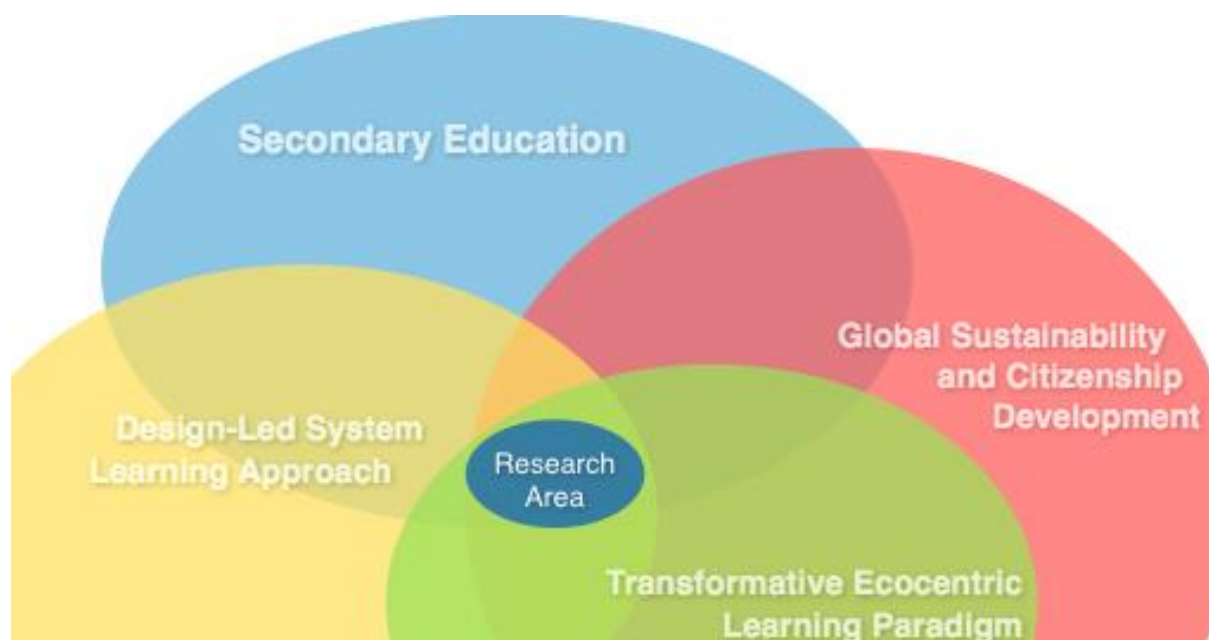
1. What are the factors involved in designing an ecocentric learning paradigm for the development of global citizenship in secondary schools?
2. How does a design-led and systems approach to learning impact the development of global citizenship in students and teachers in an Australian independent secondary school context?
3. What is the value of a design-led and systems approach to learning within an ecocentric learning paradigm for teachers and students?

5.3 Research Approach

These questions will guide a research project that will apply learning approaches based on a social constructivist epistemology and transformative learning theoretical frameworks in the context of an Australian independent school. Action research, described by Jean McNiff (2014) as “universally acknowledged as about change, collaborative and democratic practices, and a commitment towards humans’ and other entities’ well-being, including animals and the living planet” has been employed as the methodology for this research. The researcher’s role as a teacher and practitioner, the

iterative nature of design, and the reflective practices of both design and education (Schon, 1987) are well aligned with the processes and nature of action research as a qualitative methodology.

Figure 1. Diagram of position of proposed research area.



5.4 Pilot study

The pilot study will take place in the context of a design class within an independent school for young people who have disengaged from mainstream education. Designed and facilitated from within an ecocentric and transformative learning paradigm and utilizing learner-centered teaching principles, the design class will run for 4 hours a day, one day per week over 18 weeks with 5-10 students, one researcher, and one other school staff member. Students will engage in learning experiences such as design projects, workshops with local artists and designers, excursions, nature explorations, and complex group design challenges. Through a focus on sustainable product and industrial design students will identify and design for needs within the school community and look at how these might be applied in other contexts. Based on the prototypes generated the class will culminate with the development and presentation of a social enterprise that can be further developed and run successively by students of the school. In this way social entrepreneurship will be used as a relevant and meaningful way for students to engage in whole systems thinking, design thinking, sustainable development, empathy, and ecological and civic intelligence. The information in table 1 and 2 as well as the design-led systems approach definition found in section 4.2 will be used as a guide in the development of all projects and teaching materials. Students will engage in both critical reflection and rational discourse (Taylor, 1998) by participating in journal writing, focus groups, discussion groups, and entry and exit interviews. The data generated from this research will be in the form of semi-structured interviews with staff and students, focus groups with students, researcher and staff observation, and auto-ethnographic reflective methods. This triangulated qualitative data will be analyzed for emergent themes, with findings to inform the next cycle of research as well as school staff professional development and cross-curriculum integration recommendations.

6. Conclusion

This paper presents the key concepts, ideas and proposed direction of this emerging research agenda. There is significant current ecological literature calling for the urgent development of global awareness and citizenship that will help ensure a future livable planet. Education is implicated as a potential key contributor to the development of global citizenship, yet within its current dominant paradigm, education is structurally incongruent with the transformative learning required to develop global citizenship. The transdisciplinary nature of design understood as a whole systems approach to thinking and learning makes it a framework that could enable education to promote holistic human development, global citizenship and ultimately the co-creation of a sustainable future. Therefore, this paper proposes the development and trial of a transformative ecocentric learning paradigm divested from the unsustainable global economic structures and a design-led systems approach to learning.

7. Implications

This research has the potential to have a significant impact on the design and facilitation of learning experiences in independent secondary schools, design programs, teacher education and professional development, and ultimately may impact education policy. First, this research will provide evidence for educators and policy makers of the need to examine the transformative capacity of education, the importance of prioritizing global citizenship as an educational focus, and the value of design-led systems approaches to learning. Further, by establishing recommendations for a cross curriculum model implementing design-led systems approaches to learning and global citizenship, secondary schools may have the evidence to support structural changes that could result in more holistic educational outcomes. Second, this research could impact teacher training for both secondary and tertiary education around curriculum design and delivery. Third, as many of the aspects of the working definition of global citizenship are a part of the Australian National Curriculum, this research could contribute to curriculum recommendations and further development at a national level, which may include implementing design as a framework for public education. Ultimately, the application of design approaches towards global citizenship across secondary schools on a large scale could potentially influence how the next generation of Australians individually and collectively apply design and systems thinking to their worldview development, lifestyle choices, and approach to addressing global issues such as sustainability and climate change.

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