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9. EDUCATION FOR SUSTAINABLE DEVELOPMENT AND THE TRANSFORMATION OF SELF

How the World Can Become a Better Place to Live for All

INTRODUCTION

This chapter explores the nature of transformative education within different traditions arguing for a social emancipatory view of transformative education that accommodates both social change and individual transformation (Taylor, 2008) as the most appropriate way of teaching and learning for sustainable development (SD). Mezirow (2000) claims that change to our worldview is a process of learning that occurs in at least one of four ways: by elaborating existing frames of reference, by learning new frames of reference, by transforming points of view, or by transforming habits of mind. It is argued in this chapter that to enable transformative education, learning in technology education classrooms and through teacher training programs needs to employ all four approaches. A transformation of the self through design and problem solving is argued as an active way of developing a particular worldview in accord with the ideals of education for sustainable development (ESD).

TRANSFORMATIVE LEARNING

> Transformative learning is "a deep, structural shift in basic premises of thought, feelings, and actions." (Transformative Learning Centre).[1]

The theory of transformative learning when introduced by Mezirow (1978) was specifically related to adult learning and it helped to explain the ways adults changed their interpretations of the world. The work of Habermas (1971) was among the main factors that influenced the development of Mezirow's theory. Three domains of learning were proposed by Habermas: the technical (specific to a task, governed by rules), the practical (relates to social norms), and the emancipatory (self-reflection and self-knowledge). These helped Mezirow (1985) to formulate three types of learning required for transformative education: instrumental (how to learn), dialogic (when and where to learn), and self-reflective (why to learn). Critical self-reflection is argued by Mezirow (1995) to be the

central element of transformative learning. However, all three types of learning should be present as they help to transform problematic frames of reference

> sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets) – to make them more inclusive, discriminating, open, reflective, and emotionally able to change. (Mezirow, 2003, p. 58)

Critical reflection on and of assumptions when learners examine their worldview in light of their own particular beliefs is central to the process of learning when "constructing and appropriating new and revised interpretations of the meaning of an experience in the world" (Taylor, 2008, p. 5). This transformation could occur only if the deep feelings that accompanied the original perspective are to be dealt with. A global-oriented view leads to deeper and more complex reflections that involve transforming a series of meaning schemes: "the constellation of concept, belief, judgment, and feeling which shapes a particular interpretation" (Mezirow, 1994, p. 223) that in turn could lead to changes of general frames of references comprising a series of specific meaning schemes.

Since the 1980s, research into fostering transformative learning in the classroom has been based on diverse theoretical interpretations about the process of transformation. As argued by Taylor (2008), at least four main perspectives could be identified: psychocritical, psychoanalytic, psychodevelopmental, and social emancipatory views. Differences in views about transformative teaching and learning relate to the goal of personal transformation (self-actualisation) or emancipatory transformation (planetary consciousness). The first three perspectives give little consideration to the role of context and social change in the transformative experience. The "unit of analysis" therefore is the individual. The fourth perspective is focused on social transformation, so the world can become a better place for all to live in. It is as much about social change as individual transformation; it appreciates the role of social or cultural differences in transformative learning. This social emancipatory view is primarily rooted in the work of Freire (1970) who believes that people as agents should be constantly reflecting on the transformation of their worlds and acting upon these reflections. He criticised the "banking" method of learning when teachers deposit information/knowledge in students. Freire (1970) emphasised the need to develop a consciousness that has the power to transform reality. Further development of this view led to a *planetary view of transformative learning* that takes the totality of life's context beyond the individual and addresses fundamental issues of the whole system (political, social, educational) (O'Sullivan, 1999). This view recognises the interconnectedness between natural and social environments and personal worlds, and therefore requires a vision of preferred futures.

Concern over the need to develop a planetary vision that enables people to see the interconnectivities of the world and the need to address issues holistically goes back to the very beginning of the 20th century, when Vernadsky developed a theory of the nöosphere that presented a philosophically rethought image of our desirable future. Vernadsky's concept of nöosphere or the "sphere of wisdom" (tsarstvo razuma) is grounded in his research in the physical sciences and stages in

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the evolution of the planet (Vernadsky, 1926, 1945, 1998) from a geological perspective. Although our species represents an insignificant mass of the planet's matter, humankind has emerged as the increasingly dominant "geological force" in the biosphere and its strength relates to human "brain power." Therefore, Vernadsky believed that a planetary vision should frame human actions. However, technological development and an increase in technocratic ideology (particularly in the West) that was linked with the expansion of human power through technical control (Habermas, 1971) has greatly contributed to environmental and social problems that humanity is facing today. These challenges led to the emergence of discourses on sustainable development and on the role of education in achieving desirable futures.

EDUCATION FOR SUSTAINABLE DEVELOPMENT

Since the Rio Declaration on Environment and Development (UN, 1992a) and Agenda 21 (UN, 1992b) Education for Sustainable Development (ESD) discourses highlights the need to create learning experiences that help students to examine personal and social assumptions about development and environment and to understand that frames of references (worldviews) are conditioned. Twenty years later *The Future We Want: Rio+20 Outcome Document* (UN, 2012) confirms the role of education in bringing a meaningful change in people's mind-sets and attitudes in pursuing sustainable consumption and production patterns.

These new directions for education and learning, reflecting the need to increase quality and inclusiveness of education, have been formulated by UNESCO through the UN Decade of Education for Sustainable Development (DESD, 2005-2014). The DESD is an attempt to "integrate the principles, values, and practices of sustainable development into all aspects of education and learning" (UNESCO, 2005, p. 6). More specifically, ESD is about learning to:

– Respect, value, and preserve the achievements of the past;
– Appreciate the wonders and the people of the Earth;
– Live in the a world where all people have sufficient food for a healthy and productive life;
– Assess, care for, and restore the state of our planet;
– Create and enjoy a better, safer, more just world;
– Be caring citizens who exercise their rights and responsibilities locally, nationally, and globally. (UNESCO, 2006)

The Bonn Declaration (UNESCO, 2009), which marks the middle of the decade, emphasises again the role of education in "securing sustainable life chances, aspirations and futures for young people" (p. 2, point 5). Shifting one's worldview is central to education for sustainable development (ESD).

ESD is far more than teaching knowledge and principles related to sustainability. ESD, in its broadest sense, is education for social

> transformation with the goal of creating more sustainable societies. ESD touches every aspect of education including planning, policy development, programme implementation, finance, curricula, teaching, learning, assessment, administration. (UNESCO, 2012a)

These political discourses on ESD go in parallel with the educational debate about transformative education, the one that can be associated with a planetary view of transformative learning. The transformative nature of education required to address current global challenges has been argued by many (e.g., Bonnett, 2002; Sterling, 2001, 2004, 2007; Stevenson, 2006; Argyris & Schön, 2004; Lundegård & Wickman, 2007; Peters & Gonzalez-Gaudiano, 2008). It requires recognising the interconnectedness among universe, planet, natural environment, human community, and personal world through critical reflection, holistic approaches and positive relationships with others. The emphasis is on *why* we are teaching (compared to *how* or *what* we teach). It is rooted in a particular worldview and based on a particular educational philosophy. The importance of the *why* question supports the argument that ethical development is a core business of education, the ethics that are related to valuing of the other person, moral responsibility, and establishing non-instrumental relationships with nature (Campbell, McMeniman, & Baikaloff, 1992; Parker, Ninomiya, & Cogan, 1999). As argued by Pavlova (2009), *weak anthropocentrism*, the environmental ethics that promotes the mutual flourishing of human and non-human nature, could be used as a basis for transformative education that is a foundation of ESD for technology education. It provides an answer for the *why* question and leads to the need to change our worldviews (or frames of references[2]). A concern for the human condition formulated as the base principle of *Respect and care for the community of life, meaning duty to care for other people and other forms of life now and in the future* (IUCN, UNEP and WWF, 1991) could serve as a guiding value for technology education.

These calls for transformative education, based on the ethics of weak anthropocentrism/a planetary vision, form a specific framework for technology education development.

TECHNOLOGY EDUCATION AS TRANSFORMATIVE EDUCATION

A social emancipatory view of transformative education linked to a planetary vision (framed by ideas of SD) is argued here as the most appropriate way of teaching and learning in technology education. These teaching and learning processes could help students to construct and appropriate new and revised meaning of experiences gained through technology education. The nature of technology education provides a rich context to discuss and visualise desirable futures that could be shaped by technological decisions. A transformative pedagogy applied in technology education classrooms should:

– help students to recognise a situation as being ethically (morally) problematic,

– enable students to have a voice and express their feelings and thoughts, and
– find a solution that serves the best interests of all parties involved and meet characteristics of the planetary vision. (Pavlova, 2012)

Transformative learning is foremost about educating from a particular worldview (a planetary vision) that helps to answer the important question of *why* we are teaching and learning technology in schools. Classroom activities should go beyond a collection of design-briefs for students to solve; all learning in technology education should target students' understandings of preferred futures. Therefore, teaching approaches central to fostering emancipatory transformative learning need to include: *the critical reflection* (to identify the ways learning can transform society and students' own reality); the *liberating approach to teaching* (facilitating cognition through problem posing and discussions); and *equal, horizontal student-teacher relationships* (Freire & Macedo, 1995).

Project-based learning in technology education provides an opportunity to address these different ways of learning in a systematic and holistic manner through addressing SD challenges. As stated in the draft *Australian Curriculum: Technologies*:

> the priority of sustainability provides authentic contexts for creating preferred futures. When identifying and critiquing a need or opportunity, generating ideas and concepts, and producing solutions, students give prime consideration to sustainability by anticipating and balancing economic, environmental and social impacts… The curriculum provides a basis for students to explore their own and competing viewpoints, values and interests. Students work with complexity, uncertainty and risk; make connections between disparate ideas and concepts; self-critique; and propose creative and sustainable solutions. (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2013, p. 17)

Awareness of personal values is a critical component of reflection. One of the approaches that has been shown to be effective in increasing an individual's awareness of personal values and assisting in change behaviour is neuro-linguistic programming (NLP) (O'Connor, 2001). NLP consists of many techniques concerned with individual's understanding of themselves. One of the techniques, "perceptual position," helps individuals to observe situations from different perspectives (O'Connor, 2001), reflect on their values, and challenge their values in respect to that situation. Four key perceptual positions have been described (Hoag, 2005; O'Connor, 2001): (1) your own position where you evaluate your relationship with the object from the perspective of your own reality; (2) the other person's position, you place yourself in place of the other person and then look back at yourself in the first position, and then reflect on how the other feels in response to your feelings in position one; (3) you, in a detached position, observing the dynamics occurring between the first and second positions; new possibilities may arise; and (4) the wholly "objective" detached position, in which you as an independent observer clarify what has been learnt from the first and third positions

(the bigger picture). Following this line of discussions and reflections on visual images (e.g., low-cost products for poor in developing countries; green technologies; manufacturing processes that pollute the environment), a teacher can raise a number of issues related to sustainability and preferred futures. Helping students to reflect on their worldviews is an important part of transformative pedagogy as it assists students in understanding their assumptions and the need to change.

Understanding of one's own assumptions and reflections on other people's values are equally important. Real-world learning opportunities that are required for implementing technology education curriculum allow students to recognise and engage in different forms of collaboration and to understand someone's meanings when this person communicates with them. This helps students become more aware of the assumptions, intentions and qualities of the person collaborating. For example, understanding of cultural relativity and power relationships through product analysis could help students to evaluate the same products differently. Students also need to learn how to negotiate and act upon their values and meanings rather than uncritically accept these from others. Culture plays a crucial role in transformative learning.

Mezirow (2000) claims that change to our worldview is a process of learning that occurs in at least one of four ways: by elaborating existing frames of reference, by learning new frames of reference, by transforming points of view, or by transforming habits of mind ("the assumptions we receive and assume from our culture"). These processes are equally important for students and teachers.

Teachers can play an essential role in fostering transformative learning through dynamic, non-hierarchical relationships with students; through knowing students as individuals; through recognising their preferences and life experiences; through engaging them in critical reflections; and through asking critical questions that challenge assumptions and readiness for change. A framework of core competencies in ESD for educators formulated by UNECE highlights the importance of transformation, change and holistic approach (see Table 1). These qualities are very relevant to technology education teachers that use ESD as a framework for teaching and learning to "deliver" transformative education.

To enable transformative pedagogy teachers' prime concern should be with *why* they teach. They also need to be aware of their own frames of reference and how these shape their practices. Teachers need to transform themselves through the process of helping students to transform. To develop a particular worldview, a particular educational philosophy would increase the likelihood of transformative learning of the students in the classes of these teachers. For example, the Draft Australian Curriculum: Technologies uses the frame of "preferred futures" to provide guidance for teachers on *why* to teach the technology education curriculum (ACARA, 2013). Understanding and monitoring the effect of students' transformation on peers in the class, on teachers at school, and on learning in general requires additional qualities for technology education teachers. Tools to understand and interpret the "original" level of students' frames of references,

Table 1. UECE competencies in ESD for educators[3]

	Holistic approach	Envisioning change	Achieving transformation
The educator understands …	The basics of systems	The root causes of unsustainable development	Why there is a need to transform the education systems that support learning
The educator is able to …	Work with different perspectives on dilemmas, issues, tensions, and conflicts	Facilitate the evaluation of potential consequences of different decisions and actions	Assess learning outcomes in terms of changes and achievement in relation to sustainable development
The educator works with others in ways that …	Actively engage different groups across generations, cultures, places, and disciplines	Encourages notions of alternative futures	Help learners clarify their own and others' worldviews through dialogue, and recognise that alternative frameworks exist
The educator is someone who …	Is inclusive of different disciplines, cultures, and perspectives including indigenous knowledge and worldviews	Is motivated to make a positive contribution to other people and their social and natural environment, locally and globally	Is a crucially reflective practitioner

drawing up a related set of activities (focusing on technology projects and on the issues addressed beyond the technical ones), and tools to observe students' transformation and reflection on these processes should be included in teacher training programs. Specific training is required for how to use NLP in the classroom, how to observe classroom dynamics, monitoring students' responses to classroom activities and projects, and many other issues. So for teachers a strong psychological component is essential for their education together with visionary, design, technical, curriculum, and other aspects.

Saying all this, however, it is important to acknowledge that it is not an easy task to achieve. In the current climate of mainstreaming educational programs to achieve monetary efficiency, it is becoming more and more difficult to teach

subject-specific skills and competencies, as more and more often students specialising in different subjects are taught in one classroom.

CONCLUSION

This chapter explores the meaning of transformative education and the main characteristics of transformative learning and teaching. It emphasises the need for reflective learning that challenges students' and teachers' assumptions and leads towards worldview transformations that are shaped by a vision of sustainable development.

Technology education is well positioned to address the challenges of transformative education through linking actions and perspective transformation. This ability to act on preferred futures suggest that teachers need to create opportunities for learners within and outside the classroom. By employing these action- and reflection-based experiences learners will transform. Emphasis on reflection and processes accepted in the classroom help students to become more reflective as they develop. This is a developmental process requiring practice from one learning activity to another. Although rational discourse and critical reflection play a central part in transformative learning, a holistic approach that recognises the importance of feelings and the affective side of learning is very important. To enable this strong psychological component specifically, studies to address issues of transformation should be included in teacher training programs.

The practical orientation of technology education provides a unique opportunity for students and teachers to demonstrate their transformation through practical actions, designing and making products that meet the requirements of "preferred sustainable futures."

NOTES

[1]   Source: http://tlc.oise.utoronto.ca/About.html
[2]   These frames are comprised of two elements: a habit of mind (the assumptions we receive and assume from our culture) and a resulting point of view (one's actions) (Mezirow, 2000).
[3]   Source: http://www.unece.org/fileadmin/DAM/env/esd/6thMeetSC/Learning%20for%20the%20 Future_%20Competences%20for%20Educators%20in%20ESD/ECE_CEP_AC13_2011_6%20CO MPETENCES%20EN.pdf

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