The Paradox of Pedagogy: Education for Sustainable Development and Transformative Learning

Carol Scarff Seatter¹, Kim Ceulemans² & Rodrigo Lozano³

1 University of British Columbia, Faculty of Education, 3333 University Way, Kelowna, BC, V1V 1V7, Canada

2 KU Leuven - University of Leuven, Centre for Economics and Corporate Sustainability, Warmoesberg 26, B-1000 Brussels, Belgium

3 Utrecht University, Copernicus Institute for Sustainable Development, Heidelberglaan 2, NL-3508 Utrecht, The Netherlands

Abstract

As the result of the difficult challenge of teaching Sustainable Development in Higher Education, students—as future citizens—are left without insight, commitment and a sense of their position regarding meaningful sustainability belief and action. Within sustainability classes, instructors and students encounter a paradox. This paradox arises when educators approach a sustainability curriculum with the potential to transform students’ thinking and actions with a reductive and non-substantive pedagogy. This paper examines varied pedagogical and curricular approaches within sustainability courses as a means of sorting out and disclosing where the core of the problem lies. The paper is based on an epistemological and pedagogical analysis of relevant literature to redefine, clarify, and provide a more systematic and holistic understanding of a transformative pedagogy required for learning. The central thesis of the paper juxtaposes three sustainability curricular positions with three pedagogical models that vary decidedly in their emphasis on the prerogative of the learner’s prior knowledge and beliefs, the engagement of the learner and the potential for critical thinking and transformative learning. It is found that a transformative pedagogy overcomes and eliminates the paradox, helping move societies to become more sustainability-oriented. The authors offer a philosophical model of pedagogy that best facilitates effective teaching and learning of sustainability issues and challenges.

1. Introduction

Higher Education for Sustainable Development (HESD) is inspired by aims to help students to develop sustainability attitudes, skills and knowledge that inform decision-making for the benefit of themselves and others now and in the future, and to act upon these decisions (UNESCO, 2009). Thus, Higher Education Institutes (HEIs) can make a significant impact in the promotion of sustainable development as they take on various roles and responsibilities. Some of these include an education for a sustainable society (James & Card, 2012; Leal Filho et al., 1996); developing future professionals as change agents (Moore, 2005; Svanström, et al., 2008), as well as facilitate spaces where ideas are expressed freely, paradigms are challenged, creativity is promoted and new knowledge acquired and generated (Barth et al., 2007; Cortese, 2003; Lozano, 2006).
At present, HEIs are rooted in a rationalism that leads to objectivity and certainty (Lambkin, 1998; Sipos et al., 2008; Wals & Jickling, 2002); replicating Newtonian and Cartesian models (Lozano, 2011). As a result, knowledge is fragmented into disciplines (Birch, 1998 in Sipos et al., 2008; Laurillard, 2002) and teaching is delivered in large group lectures (Tormey et al., 2008) not conducive to the interaction of ideas in anything other than a superficial fashion (Curzon, 1997; Laurillard, 2002; Prosser & Trigwell, 1999).

Different kinds of models for teaching and learning are required to meet UNESCO’s challenge; the very nature of sustainable development is much more complex than certain, and multidisciplinary at many levels. The goal of higher education is to support students in developing capacity for recognizing and understanding the complexity of sustainability issues, thinking critically about assumptions, biases, beliefs and attitudes while actively participating in their resolutions.

Despite an urgent need for young people to gain vital knowledge and understanding of sustainability matters—and don the role of pro-sustainability citizens in thought and action—the very nature of the pedagogy that neglects to tend to students’ prior knowledge and lectures ‘a right position’ is untenable, and thus in the lives of the students, unsustainable. A paradox exists as a contradiction between HESD as a message that provokes thinking and action through transformative learning and current HESD pedagogy that lacks the sustenance to facilitate sustainability thinking and behaviour. This paradox pertains to a lack of sustenance within the method and message of current sustainability pedagogy, often stymied by a transmissive and lecture-driven delivery (Ceulemans & De Prins, 2010). Some questions that come to mind query this chasm between the transformative element in HESD lifelong learning and the actuality, what there is to comprehend about models of teaching that could make a difference, and whether or not sustainability courses, as they are currently conceptualized and implemented, incite learning that matches initial goals.

This paper critically analyses key philosophical teaching models for effective teaching and learning of sustainability concepts in HESD. It also emphasis key implications for HESD curricula for pedagogy. This paper is based on an epistemological and pedagogical analysis of relevant literature to redefine, clarify, and provide a more systematic and holistic understanding of transformative pedagogy required for effective HESD. Once key approaches and teaching practices are unpacked, it is the goal of the paper to coalesce key ideas to form a perspective on current teaching practices and propose possible solutions.

The paper considers the conception of transformative learning as it pertains to teaching HESD concepts and its relationship to critical mindedness. Definitions of approaches to sustainability (Alvarez & Rogers, 2006) with a focus on the epistemological and pedagogical shifts involved, are presented and discussed in light of HESD teaching and learning. The authors juxtapose approaches to sustainability with three basic teaching styles (Roberts & Silva, 1968), three philosophical models and learning types including ‘learning loops’ (Lozano, 2011) that offer an in-depth critique of the necessary conditions for an effective teaching pedagogy in acquiring an understanding of, and engaging in, sustainability-related issues and solutions. The paper positions the concept of transformative learning—catalyzed by critical thinking—as a reference point for effective HESD instruction and attempts to overcome an existing paradox of a powerful sustainability message delivered via a powerless pedagogy that results in current teaching practices that lead to unsustainability.
2. Literature Snapshot of Current HESD challenges

The current task facing HESD educators can be better understood with a glimpse of current practices and challenges revealed in the literature. The challenges are placed in order from the general to the more specific. The first challenge presents students’ common misconceptions of sustainability concepts, while the second challenge reveals the tendency by many HESD instructors to infuse the curriculum with a particular agenda. The third challenge refers to three specific approaches to curriculum found throughout HESD. Together, these challenges enhance the need for the articulation of an HESD curriculum comprising transformative content and pedagogy.

2.1 Obstacles to understanding Sustainability: Student Misconceptions

Education for Sustainability is framed by radically different ways of understanding learning that requires teachers who are prepared for transformative education with the accompanying personal transformation required (Wooltorton, 2002, p. 26-27). In order to decipher students’ comprehension of their learning of sustainability, Segalàs et al. (2010) found that students perceived sustainability as mainly related to technology and saw little relevance in the social and attitudinal aspects. A second finding showed an increase in student knowledge of Sustainable Development from courses that apply a more community-oriented and constructive, active learning pedagogical approach. In a more recent study, Segalàs et al. (2012) discovered a ‘mismatch’ among the ‘experts’ and students’ understanding of sustainability. Students' complexity index was very low revealing that either students perceive sustainability as unrelated to social and institutional aspects or they barely perceive sustainability as a complex issue. In calling for more systems and multidisciplinary thinking, a greater societal focus, a closer look at how we use the pedagogical methodologies than the methodologies themselves and a shift to active learning education, or “the reorientation of the pedagogy and the learning processes is a must” (Segalàs, 2012, p. 302)

In their attempt to overcome obstacles to understanding HESD, Lourdel, et al. (2006), pointed out numerous authors who face problems of establishing effective courses in HESD (Leal Filho, 2000; Thomas, 2004; Velazquez, 2002) and described ‘denial’. Distancing themselves from the problem often results in students not reaching their full capacity in such courses. Sustainability is compared to a never-ending staircase with a series of steps in the right direction but with no prospect of reaching ‘the nirvana of complete sustainability’ (Lourdel et al., 2006). It is clear that the many misconceptions about the nature of sustainability and the limited feasibility of making a difference, students are lacking feelings of optimism and motivation important to transformative learning in HESD.

2.2 Steering Practices

The second challenge to effective HESD discussed in this paper is the potential for imposing on students a particular agenda. In fact, many argue that the goal of current HESD is to steer students to locate themselves within the boundaries of a more or less preformed identity. One example is the work of Morris (2002), whose goal is that students “journey to and [arrive] at a particularly essentialized conception of what ecological consciousness is” (Morris, 2002 in Hayes-Conroy & Vanderbeck, 2005, p. 313). From this perspective, HESD is viewed as work directed towards a particular end, an eco-centric worldview. Kowalewski (2002) conceptualized his classroom as a “space for students to both critique (and reject) mainstream anthropocentrism and to work towards an acceptance of a deep ecological worldview”. The extreme findings are often found in pedagogy of the environmental element of
sustainability, a major component of sustainability studies. Hayes–Conroy & Vanderbeck (2005) spoke of the numerous scales utilized to determine where students stand in the sustainability debate and their scores that indicate where students should be locating themselves in relation to sustainability debates and what sorts of actions should be considered consistent with a particular pro-sustainability position.

However, understanding and identifying with a particular worldview among several should be seen as indicative of the contestability and complexity of sustainability studies (Carew & Mitchell, 2008) and an opportunity for the facilitation of critical thinking (Scarff Seatter, 2011). Rather than utilizing the complexity of HESD subject matter to support student thinking, HESD is being utilized as an opportunity to manoeuvre students into one viewpoint or another.

Fundamental changes that include a broadening of democratic structures that engage people in formulating goals, need to be an integral component of any class, course or program (Rathzel & Uzzell, 2008). For example, dominant forms of environmental education aim mainly to transmit information (Wals & Jickling, 2002). As course titles changed from Environmental Education to Education for Sustainability and Education for Sustainable Development there is no evidence that the pedagogical approach altered. This is often the case even of some supporters of strong sustainability (Huckle, 2006). Thus, they re-produce within learning situations the existing relations of power, constituting learners as consumers, instead of acknowledging them as active participants in a transformative process (Rathzel & Uzzell, p. 271). Such studies provide evidence that HEIs attempt to shape sustainability subjects (Carew & Mitchell, 2008; Cotton, 2006; Short, 2010) and raise student concerns regarding the shaping and steering occurring in sustainability classes (Hayes-Conroy & Vanderbeck, 2005). Such teaching reduces thinking and learning substantially.

2.3 Sustainability Curriculum: Three Positions

Contrary to popular belief and practice at HEI’s, curriculum is not limited to course content, although it is an essential component of curriculum (Egan, 2012). When a curriculum position or emphasis is chosen, two key epistemological questions should be answered. First, ‘What is it that students should know and understand as a result of this course? That is, what content really matters?’ and second, “How should it be taught?’ (Egan, 2012; Gibson, 2012) This is important to consider because it follows that curriculum decisions of what we teach determine how we teach.

Alvarez & Rogers (2006) described three dominant emphases of HESD curriculum, synthesized from diverse approaches to teaching HESD throughout the literature (see Discussion section). These three basic curricular positions serve as a framework to examine various approaches to teaching and learning HESD that will be put forward for the readers’ consideration in the following section of this paper. Alvarez & Rogers allow readers a glimpse of the content component of curriculum; it is the authors’ opinion that the content of the curriculum determines the pedagogical component of the curriculum.

The first curriculum emphasis focuses on definitions of sustainability—“where they have emerged from, what they attempt to achieve and how they can be compared” (Baker, 1997 in Alvarez & Rogers, 2006). Many courses are designed with such an emphasis that supports an insubstantial and reductionist curriculum.

The second curriculum emphasis focuses on implementation, establishing what is unsustainable, how to make practices more sustainable and how to evaluate sustainable

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1 In Rathzel & Uzzell (2008, p. 272), strong sustainability is depicted as ‘transformative environmental education’ and ideally features a dialogical and reciprocal direction of education.
outcomes. This modus operandi is prescriptive: environmental targets, audits, energy and water efficiency, involving "checklists, indicators, triple bottom-line accounting and ecological footprints" (Alvarez & Rogers, 2006; Wackernagel & Rees, 1996). When HESD courses are designed to emphasize implementation and results from a numeric prescriptive perspective alone, the result is similar to the first curriculum emphasis, supporting an insubstantial and reductionist curriculum.

The third curriculum emphasis focuses on sustainability as discourse, a way of both defining and controlling an agenda for change and development worldwide (Darier, 1996; Luke, 1999; Sachs, 1993; Sandilands, 1996,1999 in Alvarez & Rogers, 2006). Such work has to do with sustainability understood as a contested ‘on the ground’ discourse utilized by competing individuals, groups and cultures with an emphasis placed on the complexity conceptions of sustainability. The concept of discourse, with origins in the process of reasoning, includes written or spoken communication or debate that demands engaging in conversation and has implications of more than one viewpoint under study. When an HESD course emphasizes open-ended discourse, communication and reasoning, the curriculum opens up to be more inclusive, interactive and substantial.

The challenges to HESD described above are related to questionable pedagogical decision-making. First, students view sustainability and associated issues as simple, and straightforward, with a ‘right answer’ mindset. As such, sustainability is perceived as unrelated to attitudes, community and society. The second challenge relates to the diminution of the complexity and scope of HESD and the lack of engagement of the students’ voice in an undemocratic classroom setting. The third challenge indicates that two of three of the different conceptions of HESD curriculum are, for the most part, insubstantial and reductionist.

3. Transformative Learning and Critical Thinking: Key elements in the Literature

The concepts of transformative learning and critical thinking matter deeply when devising an effective HESD, and therefore play a key role in the dissection and investigation of three pedagogical models and the accompanying curricular positions on Sustainability (see Section 5).

The concept of transformative learning is utilized as a point of reference for individual/personal change, in this case change of one’s position on “How best to be sustainable”. The concept of critical thinking is introduced as a trigger for transformative learning and is unpacked to include what critical thinking involves, as opposed to a limited view of many instructors.

3.1 Transformative Learning

Traditional education is enacted through transferring knowledge from the one who knows to those who do not. This approach does not prepare learner for change; rather it prepares them for acceptance of the status quo, and discourages reflection and questioning. A transformative pedagogy demands asking critical questions, continually searching for new sources and ideas (Åke Bjørke, 2014). Mezirow (1997) highlighted understanding as the meaning of our experiences as the defining condition of being human. Often any ‘uncritically assimilated explanation’ by ‘experts’ will suffice while in today’s world of sustainability issues and challenges it is essential to make our own interpretations, rather than act on the ‘purposes, beliefs, judgments, and feelings of others. In this way, transformative learning develops autonomous thinking while transformative learning theory states that it does this through ‘effecting change in a frame of reference (Cranton, 1994, 1996; Mezirow, 1991, 1995, 1996).
It is the transformative learners who move toward a frame of reference that is more inclusive, discriminating, self-reflective, and integrative of experience.

Transformative learning is a process that allows students to question taken for granted frames of reference to become more discriminating, open and reflective (Greene, 2001), that produces major changes in thinking, feeling, acting, relating and being (Bennetts, 2003), and allows for evaluating values and assumptions for their effectiveness towards shared goals (Bhaskar, 2009). The conception of Transformative Learning appears in the literature as the ‘mechanism’ and ‘process’ for change at all levels of education (Green, 1973; Sterling, 2001). The HESD literature depicts transformative learning as an outcome, goal or result. It is described as the ‘competence’ to understand multiple ways of looking at the world (Svanström et al., 2008; Wals and Blaze Corcoran, 2006), and an ‘ultimate goal’ that integrates action into one’s new view of the world (Hauenstein, 1998; Sipos et al., 2008). This leads to talk of transformation learning operationally as a shift and subsequent action. In a discussion focusing on Transformative learning and HESD, the authors acknowledge essential skills of reflecting on personal beliefs, opening up to and having the competence to consider and understand the range of perspectives of others and moving towards a new frame of reference that is more inclusive and more aware.

3.2 Critical Thinking

Thinking critically accents the quality of thinking required to competently pose and solve problems, reach sound decisions, analyze issues, plan and conduct thoughtful inquiries (Case & Daniels, 2002). Critical thinking is equated with quality thinking not through the lens of a particular process, schema, or recipe but simply as a distinctive, well-crafted judgment (Scarff Seatter, 2011). It is reasonable and reflective thinking aimed at making a decision about what to do and what to believe (Ennis, 1987); it accents the quality of thinking required to competently pose and solve problems, reach sound decisions, analyze issues, plan and conduct thoughtful inquiries—operationally speaking, thinking critically occurs when a person thoughtfully seeks to assess what would be reasonable to believe or do in a given situation (Case & Daniels, 2002; Mogensen, 1997; Paul, 1982; Siegel, 1988).

Critical thinking is a necessary component of the learning process as students must learn to be comfortable with complexity, ambiguity, and multiple—often contradictory—perspectives (Sprain & Timpson, 2012); they must be enabled and self-autonomous (Short, 2010). The facilitation and utilization of critical mindedness is a necessary component in enabling students to become actively engaged with information and ideas and take action (Scarff Seatter, 2003; Shor, 1993; Short, 2010; Tormey et al., 2008). Tsui (2002) offers evidence from four institutional case studies of fostering critical thinking through effective pedagogy. The operational definition of critical thinking, provided for this study, refers to students’ abilities to ‘identify issues and assumptions, recognize important relationships, make correct inferences, evaluate evidence or authority and deduce conclusions” (Tsui, 2002, p. 743).

As a means to ensure that students are thoughtfully and actively engaged in understanding HESD concepts, the competency of thinking critically is advocated strongly within the HESD literature (Carew & Mitchell, 2008; Jensen & Schnack, 1997, 2006; Siegel, 2009). It provides a crucial underpinning for HESD as it allows one to see, believe, and act differently than when one’s thinking is uncritical.
3.3 Critical Thinking triggers Transformative Learning

At its inception, transformative learning relies on a critical awareness (Boehnert, 2010), which has been raised and developed in HESD seminars and courses. The catalyst for transformative learning is critical thinking; transformative learning has been described as an ‘achievement’ resulting from critical reflection of one’s knowledge and experiences, assumptions and beliefs and to act accordingly (Svanström et al., 2008). Mezirow (1990) examines how critical reflection triggers transformative learning by drawing a distinction between meaning schemes (sets of related and habitual expectations) and meaning perspectives (e.g., higher order schemata, theories, propositions, beliefs and ‘networks of arguments’). Thinking critically provides the leap from schemes of habitual expectations to perspectives of higher order thinking.

The nature of sustainability—a contested concept featuring an internal conflict due to its inherent trans-disciplinarity (Carew & Mitchell, 2008; Moore, 2005)—demands the facilitation of critically thoughtful judgments and actions. An understanding of sustainability is rife with an internal clash among the three components: people [society], planet [environment] and profit [economics] (Carew & Mitchell, 2008). A healthy, just and sustainable future cannot be found by unthinkingly and uncritically continuing on the same tracks (Mogensen, 1997; Wals & Jickling, 2002). It involves speculating on assumptions and their impact on decision-making (Carew & Mitchell, 2008), critically reflecting on one’s knowledge and experience, whilst continuously questioning assumptions and beliefs (Svanström et al., 2008).

Within the context of HESD literature are found concrete sustainability challenges of critical introspection and subsequent transformative learning. Orr (1992) indicated that “a paradigm change that involves seeing the unfamiliar in the familiar”, to begin to see “more than meets the eyeball” (Hanson, 1958); Sterling (2001) postulated a third transformative level of learning, a “creative re-visioning” which changes our ability to “participate, to belong and to negotiate meaning.” If transformative learning occurs there is a change in beliefs and action and that transformation is evident, especially to the learner. The evidence is an increased awareness of bias and assumptions that accompanies a reassessment of one’s position and offers a clearer, more authentic view of the sustainability challenge.

Finally, the linked concepts of critical thinking and transformative learning are found in connection with ‘action competence’, a conception proposed by Scandinavian researchers that speaks to actions related to fostering a sustainable world (Jensen & Schnack, 1997; Mogensen, 1997; Mogensen & Schnack, 2010). Their writing challenges educators to develop a radical philosophy of education that is critical and controversial, rather than one of accommodation.

In order for higher education institutions (HEIs) to become effective change agents, Svanström, et al. (2008) articulated the goals of transformation in terms of learning outcomes that relate directly to students’ professional and personal lives; while Transformative Sustainability Learning (TSL) offers a series of learning objectives corresponding to the cognitive (head), psychomotor (hands), and affective (heart) domains (Sipos et al., 2008). Sipos et al. claim an approach to achieving transformative learning in sustainability through uniting pedagogies that inform both sustainability and transformative education; the authors acknowledge and appreciate methodologies such as community service-learning, critical emancipatory pedagogy and problem-based learning, where HEI’s can enact both personal and societal transformations to sustainability.
4. Philosophical Models and Styles of Teaching

HESD remains for the most part entrenched in unidirectional, lecture-style pedagogy that is didactic and void of critical thinking and subsequent transformative learning (Lozano, 2011). HESD is lacking in the development of students who are critically mindful of the challenge involved in long-term pro-sustainability thinking and behavior.

The challenges to HESD teaching can be framed and unpacked via three teaching styles as part of a continuum from teacher-directed to extreme student-centered (Roberts, 1996; Roberts & Silva, 1968). Within this work are located the epistemological and pedagogical underpinnings of three basic approaches to teaching which can be effectively applied to instruction for HESD. The three communication styles of teaching are the Trialogue style (this teaching style includes students’ ideas as an integral essential, and significant part of the learning discourse), the Imposition style (The teacher holds the final answers and informs students what is meaningful and what is not), and the Abandonment style (The teacher's prerogative and responsibility to stand for and coach students about the reasons behind various viewpoints is usurped and student sense making is accepted as the objective of the teaching).

![Figure 1: The “Trialogue” Style](image)

Figure 1: The “Trialogue” Style

Code: “O” = Observation(s); “R/E” = Representation and/or Explanation; “S” = By the Student; “HR = By (Others of) the Human Race (Roberts, 1996; Roberts & Silva, 1968).

Trialogue Style teaching is represented here by a triangular Figure 1, suggesting a three-way dialogue among teacher, student and the domain of knowledge that is under investigation in the classroom. The students, as well as the instructor, ‘observe’ the events in the domain and bring to class some constructed representations and explanations\(^2\) of their own to the

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\(^2\) Due to the cumbersome usage of students 'representations and explanations' throughout the descriptions of the three models, the authors replace 'representations and explanations' with 'ideas' for the remainder of this paper.
investigation under study. Students' individually constructed ideas comprise ‘prior knowledge’ that forms the basis for Constructivist learning theory. On both epistemological and ethical grounds, “The existence of a student’s prior conceptions is acknowledged, and their legitimacy at the student’s level of understanding is taken as given” (Roberts, 1996, p. 422). Roberts & Silva (1968) portray the Trialogue teacher as a coach who is obliged to share with students the reasons for the differences between their own ideas (“R/E”) and the portion of their intellectual heritage under study (designated O, R/E {HR}). Communication depicted by duo-directional arrows between domain and students illustrate this continual process of sense making and information processing between the domain and the student’s world of knowledge, beliefs, and experiences. The students in turn contribute and test their ideas during classroom discussion.

Figure 2: The “Imposition” Style

Code: “O” = Observation(s); “R/E” = Representation and /or Explanation; “S” = By the Student; “HR” = By (Others of) the Human Race (Roberts, 1996; Roberts & Silva, 1968).

It is not necessarily that all topics need to be treated in a manner shown in a Trialogue style but only that students be able to critique their prior knowledge and assumptions and develop their understanding further through classroom discussions. What is important here is that communication by the teacher must be organized into the existing experience of the learner, or it becomes nothing but mere words (Roberts & Silva, 1968, p. 423).

Student ‘ideas’, in this context, stands for students’ representations and explanations’ of the domain of knowledge under study and of their own experiences.

3 Roberts & Silva (1968) use symbols to simplify diagrams. On each of the three, Trialogue, Imposition and Abandonment styles of teaching, “O” represents observation; “R” represents representations; “E” represents explanations and “HR” represents the human race, and speaks to the teacher’s knowledge and understanding of the entire domain of knowledge developed throughout history on the topic under study.
The Imposition Style teaching is represented in Figure 2 by a uni-linear figure, where students are denied the chance to exercise their prerogative to develop their own ideas or compare their own ideas with those in the greater domain of knowledge. The label of “Imposition” style is to emphasize the point that the student’s intellectual position is being “imposed” (Roberts, 1996, p. 424). The instructor holds the final answers and maintains the access to the domain of knowledge and understanding of topic under study, essentially informing the student what is meaningful and what is not. Within this model, students are allowed opportunity for discussion but it is essentially the teachers’ agenda that defines the dialogue; it is left up to the student to determine how their ideas connect with the domain of knowledge under study, which allows the student to make the material meaningful. Roberts (1996) suggests that students require a metacognitive ability to follow through on why what is being learned is a better way—or not—to deal with the domain, than their own way.

![Diagram of Imposition Style Teaching](image)

**Figure 3: The “Abandonment” Style**

Code: “O” = Observation(s); “R/E” = Representation and/or Explanation; “S” = By the Student; “HR” By (Others of) the Human Race (Roberts, 1996; Roberts & Silva, 1968).

The Abandonment Style teaching is also represented in a three-way triangular figure (Figure 3), suggesting a three-way dialogue among teacher, student and domain of knowledge. The label is intended to suggest that students are effectively abandoned to their own devices and ideas. The single double-headed communication arrow indicates that there is much discussion between teacher and student but it is limited to the students’ questions and ideas. In such a teaching style, “the teacher’s prerogative and responsibility to stand for and coach students about the reason behind the acceptance of particular explanations are insufficiently recognized” (Roberts, 1996, p. 425). Abandonment overemphasizes the student’s prerogative and “student sense making, of whatever quality, is accepted as the objective of the teaching” (Roberts, 1996, p. 425).

4.1 Other Models of Teaching and Learning

Scheffler (1973) depicted three philosophical models of teaching that coincide at many points with Roberts & Silva’s (1968) teaching styles. First, the ‘Impression Model’ is the simplest and most wide-spread of the three, picturing the mind essentially as sifting and storing the external impressions to which it is receptive. Second, the ‘insight’ model represents a radically different approach in that it denies the possibility of the ‘Impression’ Model, and states that knowledge is vision or insight into meaning, which makes the crucial difference between simply storing
and reproducing learned sentences, on the one hand, and understanding their basis and application on the other. This model does not coincide directly with any of the Roberts & Silva (1968) models but connects possibilities found within the Trialogue style. Third, the ‘Rule’ model looks to reason as always a matter of abiding by general rules or principles. Reason stands in contrast with inconsistency and with expediency, in the judgment of particular issues. (Scheffler, 1973, pp. 68-79). The similarity here between Scheffler’s (1973) Rule Model and Roberts & Silva’s (1968) Trialogue is found in the role of the Trialogue teacher as coach, who is obliged to share with students the reasons for the differences between student ideas and the domain of knowledge. That is, both the Rule Model and Trialogue justify knowledge through sound reasons that are supported with evidence. It is the teacher’s role to facilitate this process. The Rule Model offers a more direct link to discussion and critical thinking when speaking of making judgments according to particular criteria. In summary, Scheffler’s (1973) models reveal that teaching should be geared not simply to the transfer of information or even to the development of insight, but to the inculcation of principled judgment and conduct.

Turning from Models of Teaching to theories of learning, Lozano (2011), in his work on creativity and organizational learning, presents a schema that aligns with the learning loops theory of Argyris (1977). The learning loops are organized into single, double and triple-loop learning. Although speaking about how organizations learn, the three concepts of learning are particularly commanding for thinking about teaching and learning sustainability concepts.

Single-loop learning involves solving present problems, but without questioning current standards. It involves focusing on a particular task set in front of one in order to achieve particular objectives. Double-loop learning occurs when “assumptions, norms, objectives, policies, goals and programs are questioned, opened to confrontation, and submitted to comprehensive periodic reassessment against established standards, to ensure relevancy” (Argyris, 1977 in Lozano, 2011, p. 7). Double-loop learning focuses on immediate problems but ‘delves deeper into the structure of the system to identify root causes’ (Lozano, p. 6) and looks at consequences from a wider perspective (Miladinovic, 2014). Triple-loop learning engages in developing new processes. The image that emerges paints single-loop learning on a linear path, whereas a circular path outlines both double and triple-loop learning.

5. Discussion

The authors have presented and discussed the three most common curriculum positions found in Sustainability courses and coupled them with the accompanying pedagogical model best suited to each (see Table 1). For the purpose of this paper, each of the three discrete sections, depicts a distinct pedagogical and epistemological stance4. The three units are ‘Discourse Sustainability as Trialogue’, ‘Implementation Sustainability as Imposition, and Definitional Sustainability as Imposition.

The three approaches to sustainability (Alvarez & Rogers, 2006) are viewed through the lenses of the three teaching styles of Roberts and Silva (1968), Scheffler’s (1973) philosophical models of teaching, and Argyris’ (1977) learning loops. As a tool to consider and analyze some of the current practices of teaching in HESD, this chart serves as a necessary starting point for program design, implementation and teaching in sustainability courses.

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4 As in all continuums and categories, there are elements of overlap within the various sections. The separation into three distinct units is for emphasis as well as ease and clarity of discussion.
5.1 The Curriculum, Pedagogy & Learning Table

The juxtaposition of the three curriculum emphases in Sustainability—synthesized into three from numerous models in the work of Alvarez & Rogers (2006) with the three teaching models presented in the writings of Roberts and Silva (1968) and Roberts (1996)—is offered as a lens through which to conceptualize the influence of curriculum on teaching and, subsequently, the effect of teaching on transformative learning.

5.1.1 Sustainability as Discourse and Trialogue Teaching

*Trialogue* teaching style is the only model that supports a pedagogical emphasis on *Sustainability as Discourse*. The students’ prior knowledge and current ideas are integral to teaching and learning in this model. An in-depth engagement among learner, teacher, other learners and the field of study— to the level that the student is making a judgment about what is simply opinion and what to believe—is inherent within constructivist learning theory. Here prior conceptions and beliefs are contrasted and compared with current knowledge under study and new understandings are constructed (Phillips, 1995).

Justified belief results from bringing one’s ideas to the table, considering viewpoints of peers as well as the compilation of knowledge previously acquired on the topic. In today’s world, education for sustainability is caught in a high-pressured polemic where it is essential to take a thoughtful stand of one’s own (Scarff Seatter, 2011) to avoid blindly accepting ‘any of many’ diverse, contested positions. Students’ ideas as a central component of the curriculum serve as a classroom catalyst for individual introspection and evaluation of assumptions, beliefs and attitudes that influence decision-making. Here is support for critical thinking, indeed it is critical thinking in action, and subsequent transformational learning can occur.

As double-loop learning (and critical thinking) occurs when “assumptions, norms, objectives, policies, goals and programs are questioned, opened to confrontation, and submitted to comprehensive periodic reassessment against established standards” (Argyris, 1977 in Lozano, 2014, p. 7), the *Trialogue* teaching style offers possibilities for both single-loop (solving present problems) and double-loop learning. It is also the only one of the three teaching styles that has the potential to accommodate triple-loop learning, which involves thinking creatively and engaging in the development of new processes. Through discourse, debate and an honest sharing of beliefs—engagement with others’ ideas—transformative learning can be nurtured.

Scheffler’s (1973) rule model focuses on reasons, searching for and recognizing solid reasons according to particular criteria or rules. It is the student’s ideas inserted into the teaching of a sustainability topic that enriches the learning experience for teacher and students; engaging learners in the exploration of reasons and the articulation of one’s beliefs that rest on solid reasons have a firm place in the *Trialogue* classroom within a contested discourse of sustainability focus.

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5 One element omitted from Roberts’ (1996) *Triagolue* diagram is that of peer discussion and the power of peers learning from each other. As the authors consider this omission, it is the opinion of this paper that within the teacher/Student communication double arrow there is room for multiple students participating in the conversation.
Table 1: Curriculum, Pedagogy & Learning Table

<table>
<thead>
<tr>
<th>Authors juxtapose three Approaches to Sustainability (Alvarez &amp; Rogers, 2006, p.177)</th>
<th>Three basic teaching styles (Roberts, 1996) and Argyris’ (1977) learning loops theory with accompanying appropriate pedagogical opportunities (developed by authors)</th>
</tr>
</thead>
</table>
| Emphases on Sustainability as a Discourse—a contested discourse that is spoken and claimed by competing groups and cultures, rather than a concept that can be pinned down and identified in the real world | Trialogue teaching style  
- Authentic ‘field’ excursions  
- Case Study\(^6\)  
- Community Service-Learning\(^7\)  
- Active Learning  
  (Double Loop learning)  
Critical Thinking and Transformative Learning fostered |
| Emphases on Sustainability Implementation—what is unsustainable, how to make practices more sustainable and how to evaluate sustainable outcomes | Imposition teaching style  
- Lecture  
- ‘As if’ situation problem solving  
  (Single Loop learning)  
Little Critical Thinking or Transformative Learning takes place |
| Emphases on Definitions of Sustainability—where they have emerged from, what they attempt to achieve and how they can be compared | Imposition teaching style  
- Lecture  
- Traditional lab exercises  
- Question & Answer  
- Assessment: Exam and/or Essay  
  (Single Loop learning)  
Neither Critical Thinking nor Transformative Learning are fostered |

5.1.2 Sustainability Implementation and Imposition Teaching

The Implementation emphasis is described as the most reductive of the three emphases as it is a reaction against ‘endless discussions over meanings and definitions’ coupled with a plea to ‘get on with the task’ (Alvarez & Rogers, 2006, p. 177). ‘Getting down to business’ means mathematically determining, ‘What practices are unsustainable?’ How such practices are made more sustainable’ and ‘How outcomes are best evaluated’ (Wackernagel & Rees, 1996). As described above, such courses consist of a series of ‘lists, indicators, triple bottom-line accounting and ecological footprints.’ The very premise of this managerial approach is

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\(^6\) Sprain & Timpson (2012) offer ten case-based approaches for teaching about and for sustainability. This pedagogy equips students to encounter complexity, uncertainty and produce innovative strategies and solutions.  
\(^7\) Sipos et al. (2008) detail Community service-learning, Problem-based learning and other pedagogical models that relate to sustainability and transformative education.
that once we get enough of the ‘right kind of knowledge’ sustainability will happen (Alvarez & Rogers, 2006, p. 177).

The pedagogical approach that best facilitates this kind of curriculum is the **Imposition** Style. The student’s prerogative to offer his or her ideas is usurped due to a strong teacher’s agenda. In Robert’s (2006) words, ‘the student’s intellectual heritage is being imposed’ (p. 425), however it is left up to the learner to uncover what place his or her beliefs, biases and attitudes hold in the discussion (if any exists).

The possibility for thinking critically at a shallow level exists within this approach as students grapple with ideas of why a practice is unsustainable and how to fix it. However, posed within the reductionist restraints of this model, there is little room for any in-depth look at how student ideas fit into the picture presented by the instructor and any self-examination of bias, beliefs and attitudes, which is inherent within the critical thinking process and the subsequent transformative learning. Justified belief versus opinion is not addressed in these courses as there is one ‘right answer’ and the teacher holds it.

With its focus on solving present problems, without questioning current standards, the process of linear thinking and single-loop learning finds a place within the Imposition teaching style with an Implementation Focus. However, if students are given the opportunity to share their ideas of why certain practices are more sustainable than others and evaluate them, the possibility for double-loop learning also exists to some degree.

Scheffler’s (1973) Impression Model serves best here as the desired end result of such teaching is the “accumulation of the learner of basic elements fed in from without, organized and processed in standard ways, but not generated by the learner” (Italics added, p. 68). It is easy to picture how Imposition and Impression Models contribute to the success of meeting the goals of the Implementation emphasis for sustainability as there is no input or engagement required from the student to do so.

### 5.1.3 Definitions of Sustainability and Imposition Teaching Style

The most common approach to teaching sustainability is the curriculum emphasis on definitions of sustainability. The process here is best described as information delivery as the inclusion of student ideas and class discussion is unnecessary when instructing how sustainability is defined, the derivation of definitions and their purpose. The knowledge being conveyed in such courses is delivered from the instructor directly to the learner; it is only the instructor that has access to the field of knowledge and this information is communicated via uni-directional pedagogy. As in the implementation emphases, the student’s intellectual heritage is being imposed and his or her prerogative to be part of the conversation is denied. There is a dead end when it comes to thought of justified belief and unpacking differences between the students’ input and that of the instructor’s. Such a climate does not foster critical thinking nor subsequent transformative learning.

Single-loop learning can occur within the Imposition Style teaching of sustainability definitions but only if students have the opportunity to compare different definitions according to specific criteria. Evaluation of the various definitions could lead to elements of double-loop learning as well. Scheffler’s Impression Model works best here as it reinforces the key elements of the Imposition Style of teaching, as discussed above.

Each of the three approaches to sustainability depicted in the table above is subject to the Abandonment Style of teaching (Roberts, 1996; Roberts & Silva, 1968). As an example of an extreme relativist interpretation of constructivist theory, ‘Abandonment’ allows student prior
knowledge, ideas and beliefs to reign supreme; indeed these provide the source and framework for the process and outcomes of classroom topics (Scarff Seatter, 2003). Students in several studies (e.g., Hayes-Conroy & Vanderbeck, 2005) speak of the comfort level found in ESD classes where their passion and emotional responses to sustainability work are supported and nurtured. Although an instructor who listens, cares for and supports his or her students exhibits necessary educator qualities, there is little evidence that students are encouraged to make judgments based on evidence and critical reflection in Abandonment style classes. The Abandonment style of teaching is in evidence when students arrive at class with a particular mindset, which is reinforced and remains unchallenged.

5.2 Bringing Curriculum Pedagogy and Transformative Learning Together

Transformative learning refers to a change in frame of reference, moving from a personal framework of individual ideas into one that references multiple views. Within this change in frame of reference comes decision-making that is truly more enlightened and more likely to be based on sound reasoning. An understanding of sustainability, with its three-fold frame of reference, and internal conflict among its components of societal, environmental and economic sustenance, requires teaching that facilitates transformative learning. Effective HESD is only possible where transformative learning conditions exist. It follows that transformative learning can occur in other places and with other mentors (e.g. parents and community leaders), but within the classroom an instructor can either stand in the way of (Imposition Style teaching) or facilitate (Trialogue Style teaching) transformative learning.

Curriculum choices of what we teach determine how we teach (Egan, 2012; Gibson, 2012). Pedagogical decisions determine how well students learn curriculum and how effectively we teach it. What an HE instructor believes is the best way sustainability should be taught affects greatly whether or not transformative learning is facilitated in his or her classroom. A topic such as sustainability is a personal one on many levels to each one of us. Therefore, especially with such topics that affect us personally, instructors cannot escape our own passion and beliefs of what it is important for students to know and understand. An intention to follow a constructivist Trialogue design of learning is often insufficient as personal beliefs in a particular perspective of sustainability tend to override intentions of sound pedagogy and result in a swing towards Imposition design. As the circle continues, students' beliefs are imposed once again. Furthermore, even if we believe transformative learning is necessary for learning sustainability concepts most instructors do not know how to go about facilitating it. It is hoped that the criteria of the Trialogue pedagogical style, coupled with the ‘Sustainability as Discourse’ curriculum emphasis presented in this paper, will encourage instructors of HESD to consider critically their current frame of reference and be open to others.

6. Conclusion

Present and future ESD program administrators, designers, implementers and instructors should be aware of the disparate approaches in emphases and teaching styles of sustainability and their implications for student learning. The continuum table included within the discussion section of pedagogical teaching styles and sustainability emphases can be seen as a starting point for further inquiry into the essential elements of effective pedagogy for Education for Sustainability.

There is a paradox within the educational community of teaching and learning sustainability. HESD potentially supports and facilitates transformative learning, that is, within the topic itself and its sense of urgency young scholars can examine their biases, beliefs and values, be
motivated to seek and assess that which is reasonable in forming new judgments and construct new knowledge and understanding that serves them, and others, well for their future. This seldom happens.

The paradox lies in the lack of sustenance within Education for Sustainability curricula and pedagogy that tends to reinforce a reductionist agenda that negates the need for individual student’s thinking, transforming and making sound judgments. Today’s students need to be able to recognize the unsustainability of contemporary problem solving, cease searching for the ‘one right answer’ and think instead in terms of good ideas and best solutions. The inarguable quotation below best describes the position of the authors of this paper:

Nobody has a single right vision of what a ‘good’ lifestyle entails. Nobody yet knows how to best to sustain the earth’s ecosystems for the benefits of ourselves, our children…it is a myth to think that there is a single right vision or a best way to sustain the earth or what kind of earth should be sustained (Wals & Jickling, 2002)

With this open-minded perspective of the challenge of solving the problems of sustainability we can begin to think in terms of open-minded transformative pedagogy in order to overcome the paradox of a powerful sustainability message framed within a powerless pedagogy.

References


