

# THE SUSTAINABILITY MINDSET INDICATOR A Personal Development Tool

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## ABSTRACT

This paper addresses the problem of assessing, measuring, and further developing a Sustainability Mindset. This mindset is a way of thinking and being that predisposes individuals to act for the good of planet and people. It is a complex construct, developed via the path of an ecological worldview, a systems perspective, and aspects pertaining to emotional and spiritual intelligence. It is aimed at guiding individuals toward living and promoting a more sustainable life, which is crucial for humanity in the 21<sup>st</sup> century. As educators have been intentionally developing the Sustainability Mindset, it became important to find ways to assess and measure it.

The Sustainability Mindset Indicator (SMI) was designed to address this problem. This paper describes the method followed to develop the SMI: a) anchored in theories of psychology and pedagogy, objectives of the instrument and constructs of measurement were defined; b) a questionnaire was designed; and c) 320 personalized feedback reports were created. The questionnaire uses Johnson's (1992) framework of polarities and stages of human development (Kegan, 1994), whereas the reports follow the directions of Positive Psychology (Seligman & Csikszentmihalyi, 2014) and Appreciative Inquiry (Cooperrider, Whitney, & Stavros, 2008). Three validation phases were employed to confirm phrasing, improve comprehension and accurateness, and prepare for pilot studies.

The SMI represents an important addition to other scales available in the literature. It focuses on personal development and transformative learning to facilitate mindset change in individuals as well as in educational or coaching settings, and can be used to tailor interventions and assess the impacts thereof.

## KEYWORDS

sustainability mindset; indicator; personal development;  
transformative learning; human development stages

## INTRODUCTION

The lack of understanding about the nature of mindsets and their development is constraining upshift movements. (McEwen & Schmidt, 2007: 29)

This paper addresses the problem of assessing, measuring, and developing a mindset for sustainability, and describes the creation of the Sustainability Mindset Indicator (SMI). The SMI is the latest milestone in a journey that started with a new construct, the Sustainability Mindset, followed by the definition of a framework of twelve principles that describe it, which then led the authors to develop an instrument to assess such a mindset. The authors are sharing their ongoing journey from the conception of creating this instrument to readying it for pilot studies.

In 2005, one of the authors started an exploratory qualitative study to identify the motivations of business leaders who decided to change their organization to improve their social and environmental footprint (Rimanoczy, 2010). From the perspective of Appreciative Inquiry (Cooperrider, Whitney, & Stavros, 2008) and Positive Psychology (Seligman & Csikszentmihalyi, 2014), the intention was to learn from successful cases. The hope was that the study would provide educators with input regarding aspects they could integrate into their courses to develop, intentionally, socially and environmentally responsible individuals. The study explored the role information played in the leaders' behavioral change, how they thought and analyzed information, and what prompted them to take unusual steps in a business context.

The findings of the study listed a number of developable aspects, describing for the first time what a mindset for sustainability could look like. The new concept of a Sustainability Mindset is thus defined as a way of thinking and being which results from a broad understanding of the ecosystem, social sensitivity, and an introspective focus on personal values and the higher self. It finds its expression in actions for the greater good (Kassel, Rimanoczy, & Mitchell, 2018). The elements identified were

grouped into four content areas: ecological worldview, systems perspective, and emotional and spiritual intelligence (see Figure 1).



Figure 1: The Four Content Areas of the Sustainability Mindset

An international community of academics was organized with the common interest of developing a Sustainability Mindset, researching it, and exchanging pedagogical approaches and results (Ivanova & Rimanoczy, 2021). This diverse network of educators multiplied studies and research on the impact of addressing the mindset (Indrajaya, 2018), the efficacy of different pedagogical tools (Onwuegbuzie & Ugwuanyi, 2018; Schutel, Becker, & Audino, 2018); the direct relationship between developing a sustainability mindset and entrepreneurial initiatives (Akolgo-Azupogo, Bardy, & Rubens, 2018), and on other actions related to the Sustainable Development Goals (SDGs) (Brugmann, Côté, Postma, Shaw, Pal, & Robinson, 2019).

### The Mindset is Complex

We know so many things but we don't know ourselves. (Meister Eckhart)<sup>1</sup>

What became increasingly clear was that education for sustainability could be approached in two ways. One is from the perspective of knowledge, competencies, and skills, preparing individuals with information, models, benchmarks, and training

<sup>1</sup><https://www.goodreads.com/quotes/441929-a-human-being-has-so-many-skins-inside-covering-the>

to operate in a complex world. This is observable, and we will call it external, adapting the All Quadrants All Levels (AQAL) model (Wilber, 2007; see Figure 2, right side). The external perspective focuses on enriching and expanding the knowledge base and developing individual mastery in subject areas. Individuals learn and become more proficient while staying within their way of seeing the world.

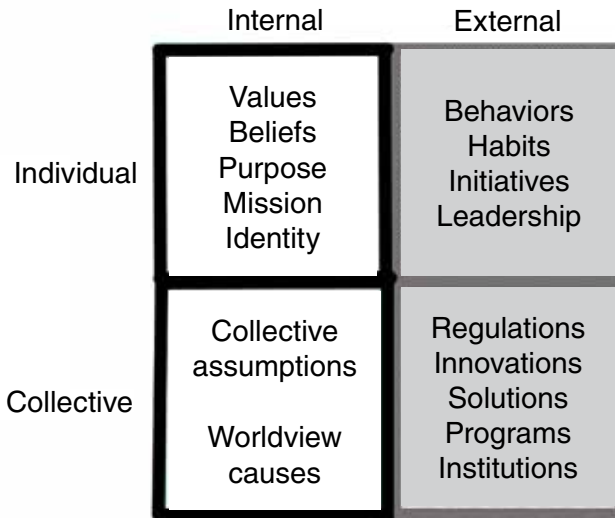


Figure 2: External and Internal Focus of the SM Education (adapted from the AQAL Wilber Integral Framework; see Wilber, 2007)

The other way of approaching education for sustainability is internal, focusing on individual values, beliefs, assumptions, anchors of identity, sense of purpose and mission, and thinking processes, as well as on collective paradigms and worldviews (see Figure 2, left side). The internal perspective addresses the foundation underlying our actions and decisions, our mindset. Individuals learn to notice the lens through which they see the world and are able to revise it, explore the up- and downsides of it, and identify alternatives. This way of approaching education for sustainability is developmental as it prompts transformative learning (Kegan, 1994; Mezirow, 1997), also called “vertical development” (Cook-Greuter, 2004; Sharma, 2018). Individuals move to broader ways of making meaning as they expand their consciousness (Torbert et al., 2004; Wilber, 2007).

To operationalize the various elements of the Sustainability Mindset and help translate them into learning goals, they were formulated as Sustainability

Mindset Principles (SMP) (see Table 1) (Rimanoczy, 2020). The twelve SMPs provide scaffolding for educators around which to design learning interventions that can accelerate the mindset shift.

PRINCIPLES IN CONTENT AREA	STATEMENT	CONSTRUCT
<b>ECOLOGICAL WORLDVIEW</b>		
1. Ecoliteracy	Understanding the state of the planet allows increasingly full awareness of the challenges involved, the complexity of their interrelation, and how we feel about them.	Sensitivity and emotional connection to the broad and humanistic picture of the state of the planet, including environmental and social challenges.
2. My Contribution	By identifying the ways in which we are contributing to the problems, we have a chance to act.	Being aware of and understanding the way in which we contribute to the problems.
<b>SYSTEMS PERSPECTIVE</b>		
3. Long-term Thinking	Considering the long-term when analyzing situations and making decisions creates positive impact on global sustainability.	Realizing the importance of considering the long-term impacts of our decisions and behaviors.
4. Both-and Thinking	Both-and thinking allows for understanding paradoxes and calls for creative solutions that are inclusive of all stakeholders. These types of solutions are key for the health of the ecosystem and create fair and peaceful societies.	Being aware of the importance of and practicing inclusion, being sensitive, appreciating diversity, showing interest in other perspectives, and the ability to put oneself in other people’s shoes.
5. Cyclical Flow	There are no linear processes in Nature: all flow in cycles of birth, growth, death, and rebirth. Many aspects of the human-created unsustainability of the planet are a result of the misconception that we are not governed by this law of Nature.	Seeing oneself as governed by the laws of Nature. Accepting impermanence and balancing the capacity to analyze and plan with the understanding of natural cycles.

PRINCIPLES IN CONTENT AREA	STATEMENT	CONSTRUCT
6. Interconnectedness	When considering both diversity and interconnectedness, our decisions and actions are more inclusive and contribute to the sustainability of the whole.	Acting with the understanding that we are all different yet connected parts of a larger whole.
<b>EMOTIONAL INTELLIGENCE</b>		
7. Creative Innovation	When we neglect the non-rational wisdom we have in us, our solutions are missing critical information, have poor quality, and may create negative impacts on the ecosystem and society.	Incorporating non-rational information—intuitive knowing, non-verbal information, creativity and imagination to experiment, and to complement rational thinking.
8. Reflection	Speed and efficiency create automated actions, which may result in unintended consequences. Reflective practices help to pause, to ponder the situation and its implications before jumping into action.	Notice of own pace; practice pausing and pondering. Slowing down.
9. Self-Awareness	When we explore our personal values, beliefs, assumptions, and motivations, we gain greater control over our own actions and see new and alternative behaviors.	Scrutinizing the anchors of our identity, the values of our culture that shape our personal automatic behaviors. Exploring alternatives to address cognitive dissonance.
<b>SPIRITUAL INTELLIGENCE</b>		
10. Oneness with Nature	Understanding that we are one with Nature, i.e., a species within species, and that all Nature is in us, a powerful spiritual experience that can shape behaviors, leading to a more harmonious relationship with each other and all beings.	Experiencing a sense of oneness with Nature; having a sensorial, intuitive understanding. Redefining the personal relationship with Nature. A spiritual connection with all that is, even cosmo-centric.

PRINCIPLES IN CONTENT AREA	STATEMENT	CONSTRUCT
11. Purpose	Defining our purpose provides an unconscious compass, and when it is grounded in values of our higher self, we actively shape a better world.	Being fully present. Expanded consciousness and quiet alertness. Awakened connection with all that is, leading to compassion and empathy; a predisposition to social and environmental actions. Centered on being. Sense of peace.
12. Mindfulness	Mindfulness enhances awareness and compassion and predisposes to social and environmental actions.	Seeking or having found a purpose; connected with the greater good.

Table 1: Definition of the Sustainability Mindset Principles and Their Respective Constructs (SMPs)

What sort of mindset has this malaise? Why do we think what we do? (Stephen Sterling [2009a: 129])

Throughout the years, scholars have been asking for a way to measure the impact of developing a Sustainability Mindset. This prompted the authors to design the SMI, an instrument to map and profile where an individual is on their personal journey toward a Sustainability Mindset. The purpose of the SMI is neither the measurement nor the assignment of a score, like an Intelligence Quotient (IQ) that assesses human intelligence based on standardized tests, but the expansion of awareness of self and the personal mindset, as well as to prompt broader consciousness. The SMI was thus created as a personal development tool, providing questions and guidance for the individual and the educator/coach to support the shift toward a more encompassing and conscious mindset. Specifically, the SMI consists of a questionnaire of bipolar statements that provides, upon completion, a personalized, developmental feedback report.

The authors present a literature review, followed by a discussion of the theoretical frameworks used in the construction of the SMI. We further present the validation process of the instrument and a discussion of contributions to its current state. The paper presents applications, and finalizes with limitations, next steps, and opportunities for future research.

## LITERATURE REVIEW

The search for leverage points to the impact of the mindset that has been present in many disciplines: systems thinking (Capra, 2007); quantum physics (Tsao & Laszlo, 2019); economics (Pirson, 2017a, 2017b; Werner & Stoner, 2018); human development stages (Hochachka, 2019; O'Brien & Hochachka, 2010); positive psychology (Cooperrider & Fry, 2012); spirituality and spiritual leadership (Dhiman & Marques, 2016; Fry & Slocum, 2008; Zsolnai, 2015); entrepreneurship and innovation (Indrajaya, 2018; Schaltegger, Hansen, & Lüdeke-Freund, 2016); consciousness (Eaton, Hughes, & MacGregor, 2016; Wamsler & Brink, 2018); transformative learning (Brunnquell, Brunstein, & Jaime, 2015; Sterling, 2001, 2009b); aboriginal wisdom (Burns, 2015; Wall & Masayeva, 2004); ethics (Biedenweg, Monroe, & Oxarart, 2013); art as pedagogy (Antonacopoulou, Ropo, & Taylor, 2019; Purg & Sutherland, 2017; Yang, Ivanova, & Hufnagel, 2019) and Corporate Social Responsibility (CSR) competency models (Muff, Liechti, & Dyllick, 2020; Wiek, Withycombe, & Redman, 2011). This wide spectrum of disciplines seeking frameworks and approaches to effect behavioral change is an indicator of the interest and urgency in finding new educational and developmental outcomes.

Some scholars focused on the thinking processes (systems thinking); others, on the paradigms at the foundation of our problems, the psychological stages of making meaning, and their connections to our sustainability behaviors. Some looked at the characteristics of entrepreneurial and spiritual leaders, and others at the pedagogical approaches to effect change. All these paths approach the cornerstone of the mindset, which has the power of leveraging transformation in how we act.

Addressing the mindset, therefore, implies critical reflection on assumptions and mental models (Senge, Scharmer, Jaworski, & Flowers, 2004; Sterling, 2007). When we go beyond content (what) and processes (how), we address the why, which can lead to transformative learning (Brunnquell et al., 2015; Mezirow, 1997). The SMPs operate at the premise level, addressing the mental maps and models, the feelings and values, and the anchors of our identity that shape our thinking and actions.

This is the approach taken by the Personal Sustainability framework (Parodi, 2011; Parodi & Tamm, 2018), which focuses on the individual (see Figure 2). The holistic approach of the SMPs— which includes cognitive, environmental, and personal/spiritual aspects—is also found in the movements of ecopsychology (Fisher,



2012), deep ecology (Cheney, 1987), human ecology (Bubolz & Sontag, 2009), and eco-feminism (Warren, 1993).

### Literature on Measuring and Assessing

Measuring and assessing human behaviors has been at the center of attention for a considerable amount of time and has various goals: to inform research; predict, diagnose, and increase self-awareness, and guide educators/counselors/coaches. Focus areas have been, among others, personality traits, preferences, maturity levels, making meaning, emotional intelligence, and levels of moral development.

Linked to our concept of mindset for sustainability, an early instrument to measure the new environmental paradigm (NEP) was created in the 1970s (Dunlap & Van Liere, 1978) and revised in 2000 (Dunlap, Van Liere, Mertig, & Jones, 2000). It uses the concepts of limits to growth, balance of nature, and anti-anthropocentrism to measure acceptance of a “new environmental paradigm.” The twelve-item scale has predictive value; however, it does not address the relationship between acceptance of the paradigm and behaviors. Also, around that time, Maloney, Ward, & Braucht (1975) developed the Ecological Attitudes and Knowledge scale to explore what individuals are willing to do, what they actually do, how they feel, and their knowledge.

More recently, the attention on planetary un-sustainability has prompted the emergence of instruments linked to sustainability behaviors. The Ecological Intelligence Scale (EIS) (Akkuzu, 2016) is rooted in consumption behaviors, using ninety-five items to measure ecological consciousness, the hidden impact of products, ecological sensitivity, and knowledge sharing. The purpose of the EIS is to study demographic and gender variations and relationships between ecoliteracy, concerns, and attitudes. Another ecological intelligence instrument (Okur-Berberoglu, 2020) provides a twelve-item scale from a holistic perspective, social intelligence, and the economy. Other measurements are the Connectedness to Nature Scale (CNS)—fourteen items that assess environmental concerns and behaviors (Mayer & Frantz, 2004); the Inclusion in Nature Self Scale (INS) that assesses connectedness and environmental behaviors, biospheric concerns, and altruistic considerations (Schultz, 2001); and the Environmental Identity Scale (EID), which measures the perception of human superiority to plants and animals (Clayton, 2003).

The Ecocentric and Anthropocentric Attitudes toward the Environment Scale (EAATE) is a thirty-three item scale organized into Ecocentric, Anthropocentric, and Environmental Apathy sub-scales and is used for scholarly purposes (Thompson & Barton, 1994); the Nature Relatedness Scale (NR) explores the affective, cognitive, and experiential aspects of the connection to nature (Nisbet, Zelenski, & Murphy, 2009). Motivations toward ecological behaviors are studied through the MTES (Motivations Toward Environment Scale) (Pelletier, Tuson, Green-Demers, Noels, & Beaton, 1998) with the aim of finding ways to encourage such behaviors.

While the purpose of these scales is mainly to further scholarly understanding and modeling, another branch of study directs attention toward the measurement of sustainability competencies, aiming at a population of students/educators, coaches, and leadership development professionals. Redman, Wiek, and Barth (2021) reviewed seventy-five tools being used to assess sustainability competencies (interpersonal competencies and systems-, future-, values-, and strategic thinking; see Wiek et al., 2011) clustered into categories of self-perception, observed competencies, and test-based approaches. The authors analyzed the strengths and weaknesses of each tool, and suggested improvements.

The Competencies Assessment for Responsible Leadership (CARL) is a questionnaire for assessing responsible leadership competencies organized around the knowledge, doing, and being dimensions (Muff et al., 2020). Subjects receive a brief automated report, including their scores, areas of potential development, and a list of readings and resources.

Looking at internal aspects that contribute to a sustainability mindset, the questionnaire assesses spiritual intelligence through twenty-one competencies (SQ21; see Wigglesworth, 2014) and addresses factors that are partially reflected in the SMPs, such as self-awareness, particularly awareness of one's own worldview (SMP 9), life purpose (SMP 11), values hierarchy (SMP 9), complexity of thought (SMP 4), and awareness of ego self/higher self (SMP 12). The SQ21 also addresses awareness of interconnectedness (SMP 6), of worldviews of others and transcendent oneness (SMP 10), and alignment with the flow of life (SMP 5).

Table 2 summarizes the focus and application of the discussed instruments.

INSTRUMENT	AUTHORS	FOCUS	APPLICATION
NEP—New Environmental Paradigm	Dunlap & Van Liere, 1978; Dunlap et al., 2000	Acceptance of new environmental paradigm: limits to growth, balance with nature, and anti-anthropocentrism	Prediction of acceptance
EIS—Ecological Identity Scale	Akkuzu, 2016	Consumption behaviors	To study demographic variations
Ecological Intelligence	Okur-Berberoglu, 2020	Holistic perspective, social intelligence, and economy	Predictive, scholarly research
CNS—Connectedness with Nature Scale	Mayer & Frantz, 2004	Environmental concerns and behaviors	Predictive, scholarly research
INS—Inclusion in Nature Self Scale	Schultz, 2001	Connectedness and environmental behaviors; biospheric concerns and altruistic considerations	Predictive, scholarly research
EID—Environmental Identity Scale	Clayton, 2003	Perception of human superiority to plants and animals	Predictive, scholarly research
EAATE—Ecocentric and Anthropocentric Attitudes toward the Environment Scale	Thompson & Barton, 1994	Ecocentric, anthropocentric, and environmental apathy	Predictive, scholarly research
Ecological Attitudes and Knowledge	Maloney et al., 1975	Relationship between knowledge, behaviors, and feelings	Predictive, scholarly research
NR—Nature Relatedness Scale	Nisbet et al., 2009	Affective, cognitive, and experiential aspects of the connection to Nature	Research of human/nature relationships
MTES—Motivations Toward Ecology Scale	Pelletier et al., 1998	Motivations toward ecological behaviors	Predictive, for research, and how to encourage ecological behaviors

INSTRUMENT	AUTHORS	FOCUS	APPLICATION
Sustainability Competencies Review	Redman et al., 2021	Review of 75 tools organized into self-perception, observed competencies, and test-based approaches. Pros and cons of each tool.	Assessment of different competencies in educational contexts
CARL—Competencies Assessment of Responsible Leadership	Muff et al., 2020	Responsible leadership competencies from the perspective of Knowledge, Being, and Doing	Assessment and development
SQ21	Wigglesworth, 2014	21 Competencies for Spiritual Intelligence	Assessment and development
SCTi-MAP	Cook-Greuter, 2004	Leadership Maturity levels	Assessment and development

Table 2: Instruments for measuring aspects related to the Sustainability Mindset, sorted by application, as identified in the literature review

The number and variety of instruments is evidence of the underlying thought that the ability to measure individual knowledge, behaviors, and emotions will ultimately help in facilitating change toward a more sustainable way of living. The SMI here adds to this effort as it evaluates all three perspectives—cognitive, behavioral, and affective—similar to the approach by Maloney et al. (1975); however, rather than focusing on being a predictive tool, the SMI provides holistic guidance for individuals and their educators in their journey toward a sustainability mindset. Such an approach appears to be thus far lacking in the currently available instruments.

## THEORETICAL FRAMEWORK OF SMI CONSTRUCTION

### Goals and Objectives of the SMI

The goals of the SMI are to provide a) new knowledge, b) guidance toward self-mastery, and c) opportunities for personal growth. These goals are further developed into objectives folded into the design of the questionnaire, personalized feedback reports, or both. Table 3a summarizes these objectives for individuals and educators. Table 3b presents where the objectives were addressed.

OBJECTIVES FOR THE STUDENT		
KNOWLEDGE	SELF-MASTERY	DEVELOPMENT
Open possibilities of alternative worldviews	Expand consciousness of self and others	Prompt “intentional change”
Introduce new angles that previously have not been considered	Expand self-awareness (values, hierarchy of values, contradictions between thinking, doing, being)	Prompt reflection via questions, suggestions
Provide language for aspects that the individual might not clearly grasp or describe	Prompt consideration of the “ideal self” versus the actual self, the ego self, and the higher self	Map and profile the current place in the personal journey
Develop awareness of the sustainability mindset	Challenge current assumptions	Offer resources
OBJECTIVES FOR THE EDUCATOR		
<ul style="list-style-type: none"> <li>• Offer a map showing where the individual/group is, with strong and weak areas</li> <li>• Provide suggestions, guides, and resources to plan and implement activities</li> <li>• Evaluate the impact of training and courses developing the SM</li> <li>• Allow for pre-post studies, longitudinal research, comparative studies, and demographic variations</li> </ul>		

Table 3a: Objectives of the SMI for the Student and the Educator

OBJECTIVES	Addressed in questionnaire	Addressed in report
1) Open possibilities of alternative worldviews	x	x
2) Introduce new angles	x	x
3) Provide language	x	x
4) Expand consciousness of self and others	x	x
5) Expand self-awareness	x	x
6) Prompt consideration of “ideal self” versus the actual self	x	
7) Prompt “intentional change”	x	x
8) Challenge current assumptions	x	x
9) Prompt reflection	x	x
10) Develop awareness of the sustainability mindset		x
11) Map and profile the current place in the personal journey		x
12) Offer resources		x

Table 3b: Objectives of the SMI Addressed in Questionnaire, Report, or Both

## Design Frameworks

The authors utilized several frameworks of psychology and pedagogy in establishing the criteria for the design of the SMI to meet the objectives outlined in Table 3a.

*1) Open possibilities of alternative worldviews; 2) Introduce new angles and perspectives.* Argyris (1976) describes the importance of our mental models as they affect how we see ourselves and others, interpret information, create action strategies, and navigate work and life. He conceptualizes profound inner transformation through his Model II, where an individual develops the ability to deal with complexity (SMP 4) and change (SMP 5), becomes more flexible (SMP 7) and inclusive (SMP 4), expands the thinking perspective to the long-term (SMP 3), becomes less self-defensive (SMP 9), and reduces automatic behaviors (SMP 8 and 9). Mental models, personal mastery, and systems thinking are also three of the five disciplines of a learning organization that address the individual level (Senge, 2006).

These conceptual frameworks were connected with the perspective of human development stages, which describes making meaning and interpreting the world in progressively wider scopes of consciousness and caring (Kegan, 1994; Loevinger, 1976; Torbert et al., 2004; Wilber, 2007). The levels of maturity have been associated with more prosocial (Bar-Tal, 1976) and pro-environmental mindsets (Brown, 2005; Hochachka, 2005; McEwen & Schmidt, 2007; Mirvis & Googins, 2006; O'Brien & Hochachka, 2010; Waddock, 2006; Willard, 2005). As a result of connecting these frameworks, the instrument was designed to represent the pre- and post-conventional stages of making meaning. This meant to include statements that would allow a clear identification with those major ways of seeing the world.

*Introducing new angles and perspectives* was also addressed in the Personalized Reports (PR) following development-oriented approaches (Cook-Greuter, 2004; McEwen & Schmidt, 2007; O'Brien & Hochachka, 2010; Sharma, 2018) by considering the possible developmental stage of the individual and providing appreciative questions to address the downsides of that perspective.

*3) Provide language for aspects that the individual might not clearly grasp or describe.* Sterling offers one of the most complete descriptions of essentials for developing a mindset and paradigmatic shift (Sterling, 2004, 2007, 2010; Jones, Selby, & Sterling,

2010). In his critique of the educational systems and pedagogies for sustainability, he highlights the importance of understanding life and natural cycles, long-term thinking, both-and thinking, and interconnectedness (SMP 3 to 6) while focusing on ecoliteracy, particularly exploring the values expressed in unsustainable decisions and our personal values (SMP 1 and 2). He further recommends exploring the habits of mind, the values of our civilization, and how individuals adopt a shared paradigm (SMP 8 and 9). He does not include emotions and feelings, or aspects like purpose, a sense of oneness, and mindfulness (SMP 10 to 12).

Other authors have studied the correlation between feelings/emotions and spiritual aspects with regard to prosocial and pro-environmental behaviors (Einolf, 2013; Garfield, Drwecki, Moore, Kortenkamp, & Gracz, 2014; Wamsler & Brink, 2018). The inclusion of these aspects became of particular importance for the SMI since the authors saw a way of providing subjects with new language, with the ability to name and recognize aspects they may have experienced but not discussed in academic or private settings (except in religious institutions).

*4) Expand consciousness of self and others; 5) Expand self-awareness (values, hierarchy of values, contradictions between thinking, doing, being).* The Leadership Development Profile-MAP (Cook-Greuter, 2004) is a personal development tool that assesses an individual's maturity level in the context of leadership. It is a modification of the Washington University Sentence Completion Test by Loevinger (1976), an ego-development assessment designed for clinical use. The items of the SMI were designed while paying attention to the hierarchy of values in different stages of the individual's development, particularly observing that the choice of words portrayed respect and value for the current developmental phase.

The conceptual framework of polarities (Johnson, 1992) offers an important distinction between problems to be solved and polarities to be managed. Problems need a resolution in time. Polarities are ongoing—the options are interconnected, like in the dilemma of being independent or of being sensitive to other stakeholders' opinions. Each pole has up- and downsides, and optimal management requires minimizing the downsides of both poles while keeping the upsides. This model became an essential criterion for the SMI as the authors sought to balance both poles in the questionnaire. For example:

- a. Focusing on the short-term is a way to speed up and bring useful certainty to decisions as the decision-makers do not have time to think of the long-term.
- b. It takes some imagination to visualize what the long-term impacts might be, and it slows the decision process, but it is very important.

Option a) states the upsides of short-term thinking and option b) states the down- and upsides of long-term thinking.

This approach has two goals: to facilitate the identification of the subject with one statement and to introduce an alternative that may not sound so bad, therefore opening the path for expanding consciousness. Choosing one of the statements is difficult when the individual has good management of the polarities, with neither predominating but being contextually applied. The instructions ask the subject who finds himself or herself represented by both to ponder if one fits slightly better than the other. This provides a report that considers the transition the subject may be in. The SMI also provides the option of “neither.” The statements are selected to include the most common paradigm and the aspects less present in the common paradigm (e.g., short-term efficiency is valued more frequently than long-term efficiency).

A literature review in the fields of CSR, management education, and ethics found common patterns in the categories of thinking/knowing, acting, and being (Kassel & Rimanoczy, 2018: 9). These categories are considered important for behavioral instruments, and therefore also when assessing sustainability motivations and behaviors. The authors used the categories of Cognitive (knowing), Behavioral (acting), and Affective (feeling) in the design of the SMI. Festinger’s (1962) theory of cognitive dissonance was also considered as the discordance between a subject’s knowledge, values, and behaviors was anticipated as a potential motivator for exploring behavioral alternatives (Harmon-Jones & Harmon-Jones, 2007).

*Expansion of self-awareness (values; hierarchy of values; contradictions between thinking, doing, and being)* was also met in the Personalized Report via questions and phrases that addressed the importance of one’s values, purpose, sense of oneness, and pace of life. These followed the conceptual frameworks of Spiritual Leadership (Fry, 2009), existential questions (Neal, 2001), hierarchy of values (Indrajaya, 2020), and vertical development (Sharma, 2018).



6) *Prompt consideration of the “ideal self” versus the actual self, the ego self, and the higher self;* 7) *Prompt intentional change.* An important contribution to the conceptualization of the SMI was Intentional Change Theory (ICT; see Boyatzis & Akrivou, 2006). The ICT describes the role of the ideal self, an image of a desired future, of hope, self-efficacy, optimism, and a positive sense of one’s identity based on strengths, traits, and dispositions. Inviting subjects to consider the ideal self creates positive emotions which can move the individual toward tipping points in a discontinuous process of transformation. “Who do you want to be?” is a question that the ICT authors think is not sufficiently asked. They suggest that individuals can be inspired to set their own personal development agendas, something the SMI invites to do through prompts and questions in the Personalized Report. Boyatzis and Akrivou (2006) point at the importance of “attractors,” which are positive emotional forces that destabilize and move the individual toward a better version of self. The authors used this conceptual framework in the formulation of the bipolar statements where one option may be “good” but the other may be “better” (if the subject is ready to see it). An additional benefit of this framework is that “dreams inspire others” (Boyatzis & Akrivou, 2006: 12), meaning that individuals who shape a positive image of their ideal selves become fractals with multiplying impact potential. The authors loved thinking of the SMI as an instrument for multiplying fractals of change!

8) *Challenge current assumptions;* 9) *Prompt reflection.* The Competency Assessment for Responsible Leadership (CARL; see Muff et al., 2020) uses time reaction as a criterion to minimize the social desirability factor in responses. When a subject takes more than a few seconds, the answer is automatically nullified. The authors discussed the purpose and context of the SMI: a personal developmental experience by itself that has the possibility to trigger new thoughts just through reading about unusual/unexpected statements and having to make a choice. The social desirability factor as well as subjective self-perception were considered irrelevant since the SMI is not meant to establish what an individual “objectively” is or feels; rather, it provides a mirror that reflects the subject and prompts new thinking. Being slow and thoughtful when pondering the options to choose from is actually welcome since it launches by itself a developmental process.

Mezirow (1997) explains that when one experiences a disorienting dilemma (in the SMI, this would be in the cognitive dissonance prompted by one’s awareness of

one's contradictions between values, feelings, and behaviors), one is on the path of profound transformative learning. Nowack (2017) indicates that self-awareness has to be complemented with social support, which the SMI provides through guides and special reports for the educator/coach. Lasting change requires three steps (Nowack, 2017): enlighten (SMI PR feedback information triggers the identification of strengths, addressing the ideal versus the real self), encourage (reports prompt goal setting, skill building, self-efficacy, and motivation), and enable (reports for individuals and educators/coaches provide resources, network possibilities for social support, and evaluation of progress).

*Challenging assumptions and prompting reflection* were implemented in the PR through thought-provoking questions (Sterling, 2010; Jones et al., 2010) which were proven to be more powerful than suggestions and tools (Adams, 2016).

*10) Developing awareness of the sustainability mindset* was planned into the PR via informational paragraphs, pointing at the importance of ecoliteracy for broadening one's understanding (Orr, 2006; Sterling, 2009b; Kumar, 2013) as well as at the theories of the Ideal Self and Intentional Change (Boyatzis & Akrivou, 2006) (i.e., "You may not have noticed that much of our un-sustainability is linked to how we think and make decisions" [quoted from the PR]).

*11) Mapping and profiling the current place in the personal journey* was covered in the PR following the models of Intentional Change (Boyatzis & Akrivou, 2006) and human development stages (Brown, 2005; Cook-Greuter, 2004; McEwen & Schmidt, 2007; O'Brien & Hochachka, 2010) by avoiding the use of scores, numbers, or levels and instead depicting the results graphically in a sunburst-chart (see Figure 3 and the explanation in the section on SMI development), with sections of different sizes suggesting that the "ideal" graph balances all the aspects.

Finally, the PRs are carefully worded following the Appreciative Inquiry (Cooperrider et al., 2008) and Positive Psychology (Seligman & Csikszentmihalyi, 2014) frameworks, seeking to convey an uplifting, caring, and sensitive tone through every line. According to theories of planned behavior (Ajzen, 1991), self-efficacy (Bandura, 1989), and Goal Setting Theory (Locke & Latham, 2002), having a vision of what is possible is of utmost value. Understanding the disadvantages of behavioral change is a predictor of sustained behavior, and for this the PR mentions how it will be difficult but worth the effort.

### Report for Educators

The objectives with respect to educators are addressed in the Educator Report (EP), which features an overall, collective map of where the group is. The individual PR will not be shared; however, subjects are free to share these with their coach/educator if so desired. The Educators’ version of the report will provide additional resources, suggestions, and networking links to expand the circle of social support among colleagues. The EPs also offer the possibility to draw comparisons between pre- and post-course results, between results in different content areas, across different cohorts, and, furthermore, will allow the studying of demographics.

### SMI DEVELOPMENT AND VALIDATION

Based on the theoretical frameworks discussed in the previous section, a construct for measurement was defined for each SMP (see Table 1). The next step was to identify the narrative of the mainstream paradigm and the aspects that could be developed for a Sustainability Mindset. The SMPs imply that we have an underdeveloped aspect-polarity and a significant preference for another, i.e., a preference for short-term, preference for individualistic thinking, preference for materialistic satisfaction, preference for business focus, and preference for rational thinking (see Table 4). These preferences are linked to the Dominant Social Paradigm (Dunlap & Van Liere, 1978) and to a subject’s developmental stage. The SMI’s intent is to open opportunities to rethink, challenge, and revisit existing beliefs and values.

PRINCIPLE	ASSUMED MOST COMMON MINDSET	WHAT DOES THE SUSTAINABILITY MINDSET PROPOSE?
Ecoliteracy	Siloed information, rational knowing, no feelings.	We need both: a broad, interconnected understanding needs to be further developed which also includes acknowledging feelings.
My Contribution	Blaming others for the problems, demanding solutions from others.	We need both: demanding solutions <i>and</i> acknowledging the ways in which we are personally (unintentionally) contributing to the problems. The latter needs to be further developed.

PRINCIPLE	ASSUMED MOST COMMON MINDSET	WHAT DOES THE SUSTAINABILITY MINDSET PROPOSE?
Long-term Thinking	Focus on the short term.	We need both: to pay attention to the short-term <i>and</i> the long-term impacts of our decisions and behaviors. The latter needs to be further developed.
Both-and Thinking	Either or logic, zero sum.	We need both: discerning when a problem can be solved with an either-or logic and when it is a polarity that has to be managed using both-and thinking.
Cyclical Flow	Linear planning for control, also narratives of linear growth.	We need both: planning, linear thinking, <i>and</i> understanding the larger cyclical flows of everything in Nature, considering it accordingly. Underdeveloped.
Interconnectedness	Focus on autonomy, self-determination, individualistic thinking.	We need both: we are all different yet interconnected, and we need to incorporate that perspective when making decisions and interacting. Underdeveloped, particularly in certain cultures.
Creative Innovation	Rational thinking prevails and is more accepted and expected than intuitive knowing.	We need both: our unsustainable planet requires innovation in all areas, which calls for unleashing creative thinking. Intuitive knowing, creativity, and alternate ways of knowing need to be accepted and promoted for a better balance of our human capacities.
Reflection	Act quickly, prompt reactions. Speed is valued greatly.	We need both: acting quickly is most appropriate in certain circumstances, yet pausing and pondering can provide more information and understanding, leading to more thoughtful actions. In our unsustainable world, the habit of reflecting needs to be brought back and developed as an important contribution to better decisions and actions.

PRINCIPLE	ASSUMED MOST COMMON MINDSET	WHAT DOES THE SUSTAINABILITY MINDSET PROPOSE?
Self-Awareness	Our unsustainability is anchored on many culturally valued aspects that shape the individual identity.	We need to scrutinize and explore the values anchoring our identity and ponder our alternatives. This requires introspective practices that can expand our self-awareness and bring about more sustainable and satisfactory behaviors.
Oneness with Nature	Disconnection from Nature, which is seen as instrumental or a resource.	We need to re-connect with Nature and re-establish the experience of oneness that had been lost, causing not only spiritual alienation but also the artificial separation of individual and ecosystem which is at the base of many unsustainability behaviors.
Purpose	Efficiency, focus on transactions and daily tasks.	We need both: taking care of the daily tasks <i>and</i> developing a sense of larger purpose, to bring fulfillment and contribute to the larger good. Underdeveloped.
Mindfulness	Focus on doing.	We need both: focusing on doing <i>and</i> cultivating our spiritual dimension that provides grounding and framework as well as balance and right perspective. Need development of contemplative practices.

Table 4: SMP, Dominant Paradigm, and Proposed Mindset Development Aspects

Next, Attributes were developed, to be assessed from the cognitive, behavioral, and affective perspectives (see example in Table 5).

This resulted in the formulation of 77 bipolar statements (see the example given in the previous section), covering the cognitive, behavioral, and affective attributes of each of the 12 SMPs. The formulation is grounded in the aforementioned ITC (Boyatzis & Akrivou, 2006), which suggests that something is GOOD (reflected by one statement) and that something else is BETTER (reflected by the other statement) while acknowledging and honoring the individual developmental stages, centers of gravity, worldviews, and perceptions of self toward the world. Over the course of the

validation phases, the number of statements was narrowed down to one per SMP and attribute, i.e., to 36.

The validation of these statements was performed in three phases which are summarized in Table 6.

CONSTRUCT	COGNITIVE ATTRIBUTES	BEHAVIORAL ATTRIBUTES	AFFECTIVE ATTRIBUTES
<p><b>Sensitivity and emotional connection to the broad and humanistic picture of the state of the planet, including environmental and social challenges.</b></p>	<p>Knowing and thinking about the linkages between environmental and social challenges.</p> <p><i>paired with</i></p> <p><i>Recognizing that some are not aware of or get confused by the connections.</i></p>	<p>Changing habits to lower the carbon and/or social footprint.</p> <p><i>paired with</i></p> <p><i>Recognizing that some focus on their own needs and don't see or consider changes.</i></p>	<p>Feelings and emotional reactions to the challenges of the world (whether anger, guilt, despair, frustration, hopelessness, etc.).</p> <p><i>paired with</i></p> <p><i>Recognizing that some protect themselves from negative feelings.</i></p>
	<p>Examples of Statements:</p> <p>Social problems create environmental problems and vice versa.</p> <p>Some people say all the world's problems are related, but to me this complicates matters more than they already are.</p>	<p>Examples of Statements:</p> <p>My understanding of, or feelings about, the planet impact my habits/decisions.</p> <p>Unfortunately, my everyday needs <i>must</i> take priority over my carbon footprint.</p>	<p>Examples of Statements:</p> <p>When I hear about social or environmental challenges, I feel sad, anxious, angry, guilty, frustrated, scared, worried, and/or overwhelmed.</p> <p>I don't get sentimental with ecological problems I cannot solve.</p>

Table 5: Examples of Constructs with Cognitive, Behavioral, and Affective Attributes

PHASE	OBJECTIVE	MAIN RESULTS
One	Validation of statements: is the meaning of an SMP correctly captured?	50% of the statements required review; eight were revised
Two	Identification of potential linguistic issues and logical flaws	Statements reduced to one pair per principle and attribute; 50% of statement pairs edited; “neither” option introduced
Three	Validation of improvements and reports	Two minor edits

Table 6: Overview of validation phases of SMI

*Phase 1: Validation of the meaning of statements.* The objective of this phase was to confirm if a statement indeed reflects the construct of the respective SMP as well as to test general comprehensibility, following a procedure suggested by Bento Ambrósio Avelar (personal communication, 2021). Participants were recruited from an international educator network familiar with the SMPs. The statement list was randomized to avoid easy identification of the underlying SMP.

The participants were given a statement together with four sentences. One sentence was a true match with the statement and up to two could be related. At least one sentence was unrelated. Participants were asked to identify the matching statement, and if more than one was identified, to rank them according to matching level. The choices and rankings were turned into scores, based on which 50% of the statements required review and eight were actually revised.

*Phase 2: Mock-survey for the identification of issues of language and/or logic and development of PR coding.* The validated and revised statements were now prepared with the aims a) of receiving input regarding comprehensibility and language and b) of generating sample data for the development of the automated PR system. 15 volunteers (some with knowledge of the SMPs and some without, to test the response also from an audience unfamiliar with what the authors intended to measure) participated.

A scoring scheme was developed that gave the cognitive and behavioral attributes equal scores while the affective dimension received a higher score, as research has shown that change only manifests itself once people develop emotions toward an issue (Brosch, 2021; Fröhlich, Sellmann, & Bogner, 2013; Kals & Maes, 2002; Kals & Müller, 2012).

The purpose of the scoring is two-fold. First, it creates a sunburst chart that shows the participants the current developmental stage of their sustainability mindset for each SMP (see Figure 3). Aligned with the principles of Positive Psychology (Seligman & Csikszentmihalyi, 2014), the graph is not numerical; rather, it shows the relative expression in the SMPs, avoiding judgmental sentiments. Second, the scoring codifies the PR, sending the participant the respective report for this combination of cognitive, behavioral, and affective attributes.



Figure 3: Example of the Sunburst Chart

Participants provided constructive feedback through comments. Again, about 50% of the statements were improved with regard to wording and expression. Furthermore, most participants stated that the option of “neither” should be included to reflect a situation where one does not identify with either of the options, which was done.

*Phase 3: Validation of improvements and validation of report.* This phase included individuals who had not seen the instrument previously and have various levels



of familiarity with the SMPs. Analyzing the comments resulted in two minor edits and confirmed overall that the instrument was now consistent. The results of this phase were used to develop and improve the reports further, which were sent to the participants again to receive feedback. Even with the results reported in this paper, this step continues until now in order to improve the reports further.

## DISCUSSION AND APPLICATIONS

Following the direction of Positive Psychology (Seligman & Csikszentmihalyi, 2014) as well as of Appreciative Inquiry (Cooperrider et al., 2008), the SMI is a non-judgmental tool in that it points from GOOD to BETTER, prompts reflection, and assumes that individuals are who/where they are and have the autonomy to decide where they want to/will go. With that, it is an important addition to the rich sources of currently available instruments. By also including behavioral attributes, it goes beyond the NEP (Dunlap & Van Liere, 1978; Dunlap et al., 2000) and differs from Maloney et al.'s (1975) framework as it focuses on personal development and transformative learning rather than on predictive research. While several instruments aim at the assessment and development of various mindset attributes (CARL [Muff et al., 2020]; SQ21 [Wigglesworth, 2014]; SCTi-MAP [Cook-Greuter, 2004]), the SMI specifically addresses the sustainability mindset and therefore hopes to become an important tool for individuals, educators, and coaches.

In the three phases of development, the authors have tested and validated the representation of the SMP constructs throughout the 36 bipolar statements that comprise the final tool as well as the linguistic facets that are aimed at providing a truly appreciative and reflective instrument. Through diligent reviews and revisions, the questionnaire has been refined, and a similar process for the PRs is ongoing. To date, the SMI has been rated at an average of 4.7 points in terms of accuracy and usefulness on a 5-point Likert scale ( $n = 72$ ).

The authors have been approached by professors in higher education who are interested in implementing the SMI as a pre- and post-tool in their courses to establish where the incoming students are in terms of mindset, focusing on the areas in need of development and assessing the impact of their respective courses. A similar request has been placed by institutions designing a new training program and by leadership development consultants of European financial institutions.

Other anticipated applications are studying variations in the sustainability mindset according to demographics, educational background, and disciplines, and using the SMI as a development tool for coaches and consultants in corporations, to support the training of employees in NGOs and community leaders, and as an instrument to assess the impact of higher education institutions in developing a sustainability mindset, be it as a component of their PRME (Principles of Responsible Management Education) reports or their AACSB/EQUIS (Association to Advance Collegiate Schools of Business/EFMD Quality Improvement System) certification. Longitudinal studies can further assess the impact of the learning experience beyond the classrooms.

Measuring the impact of sustainability courses is oftentimes focused on assessing the behaviors students engage in to make a difference in the world or to further the SDGs. While the SMI assesses the mindset, it has to be noted that behaviors make a mindset visible; they are the mindset in action. In other words, we cannot act outside of the paradigm/worldview that we are in unless we notice it and consciously try to act differently. Once we shift our mindset, our decisions and actions automatically become different too. This fact provides the development of a sustainability mindset with great leverage and potential for accelerating change.

## LIMITATIONS AND OUTLOOK

The SMI has been developed based on the conceptual framework of the Sustainability Mindset Principles. They cover four content areas: Ecological Worldview, Systems Perspective, and Emotional and Spiritual Intelligence. Even though the SMI is designed with a holistic and comprehensive approach, a person's mindset may be influenced by other aspects beyond those covered in the SMP and assessed in this instrument, such as cultural context, for example. Furthermore, the SMI does not avoid self-perception bias (Robins & John, 1997) and social desirability factors (Chung & Monroe, 2003) based on the assumption that it mirrors where individuals see themselves, not where they "objectively" are. It is unclear what consequences or implications this may have for subjects with low self-awareness.

While the authors solicited the insights of SMP experts as well as of individuals unfamiliar with the concept, the number of participants in the different validation phases is limited. To further test the instrument, a pre- and post-pilot test with

students will be conducted to observe if the instrument is showing differences for groups that are consciously learning about Sustainability Mindset content compared to others that are not.

Of interest as well will be an investigation of participants choosing “neither” answers, their motivations, and reactions to their reports.

Translation of the SMI is being planned to allow adjustment to different cultural contexts. Lastly, case studies can provide a richer understanding of the application of the SMI in different contexts, such as, for example, with graduates and undergraduates, or leaders or educators, along with studies that explore the possible predictive value of the instrument.

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