Paper 109. Key Competencies for Collaboration Between Engineers, University Students and their Communities for Sustainable Development in the Caribbean: A Psychological and Sociocultural Perspective

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Abstract

Which key personal and interpersonal competencies help make an individual an effectual participant in the collaboration and coordination necessary to design, develop and, implement the technology, knowledge and, ultimately, the social changes necessary to move global societies toward a sustainable future? In this paper we introduce psychological and sociocultural research that seeks to identify these key competencies as they occur within real-world collaboration and coordination for community sustainability. We report here a case study on the various initiatives begun by the Caribbean Green Technology Center (CGTC) at the University of the Virgin Islands to bridge the engineering and science community (faculty and students) with other scientific institutions, the local business community, various government agencies, local stakeholders, and the island community in general in a collaborative effort to transition the USVI toward sustainability and sustainable development. In this case study, we utilize content analysis comparison of interviews held with members of the CGTC to characterize their attitudes, behaviors, and experiences with regard to collaboration and coordination for sustainability. We compare these results with similar ongoing research with individuals pursuing sustainability initiatives in Arctic and American communities. These results are then compared to an inductive content analysis of the research literature. Though this is preliminary research with a small sample size (n=20), from this comparative data we are able to begin to derive what appear to be some of the key individual competencies necessary for the most effective participation in cross-disciplinary and cross-sectoral collaborative communities. Our research reveals that some of the individual competencies most equitable with collaboration and coordination in communities for sustainability include authentic leadership, social connectedness, and personal resilience. Comparing our results to the literature suggests that these key competencies may be valid and effective across cultures and across the diverse challenges of generating sustainable communities. We are now beginning to investigate how these key competencies might be developed through university education programs utilizing a collaborative education/learning process between students and their communities; we call this learning process the Sustainable Futures Protocol (SFP). Implications of our work and future research is described.

1   Introduction

Valid and effective knowledge and technology design, creation, translation, mediation, transfer and implementation at the local level is contingent upon the establishment of salience, legitimacy and credibility within the community with regard to that knowledge and technology (Mitchell *et al.*, 2006) as well as effective collaboration and coordination of action across cultures from the local to the global scale (Bai *et al.*, 2009).

While there have been previous calls to link the social with the natural sciences in a collaborative and coordinated effort to transition communities around the world toward sustainability (see Ostrom 2007), the initiative termed *Future Earth—Research for Global Sustainability* (Mooney et al., 2013) arguably represents the most ambitious effort to do so to date. The various social sciences; and, more specifically, those outside of the already highly contributory fields of economics and human geography, have been called upon to participate with the cross-disciplinary mitigation, adaptation and transition research community (Mooney *et al.*, 2013). The social sciences can be defined as,

> Any number of disciplines concerned with the social interactions of individuals, studied from a scientific and research perspective. These disciplines have traditionally included anthropology, economics, geography, history, linguistics, political sciences, psychiatry, psychology, and sociology, as well as associated areas of mathematics.....The focus of analysis ranges from the individual to institutions and entire social systems. The general goal is to understand social interactions and to propose solutions to social problems. (VandenBos, 2007, p 869).

Psychological and sociocultural perspectives, in particular, can serve an important role in initiatives for sustainability. As Koger (2012) wrote recently,

> Achieving environmental, cultural, economic, and social sustainability is predicated on changing human behavior; the purview of Psychologists. For instance, research based in cognitive, social, and behavioral psychology has informed initiatives regarding public education and advocacy, framing of messages, decision making, incentive-based regulation, and social marketing.

Taking a sociocultural perspective refers to any aspect of human experience that "emphasizes the environmental factors of society, culture, and social interaction" (VandenBos, 2007, p.871). Sociocultural perspectives are important because, as described further, they can support best practices for collaborating and coordinating effective and valid action across boundaries of societies and their cultures. Understanding these perspectives through research, keeping these perspectives in mind as we collaborate, and implementing them in practice will help forward global sustainability.

Arctic and small island communities are an accelerated and intensified model for the rest of the world with regard to the need for mitigation and adaptation to the impacts of climate change and the urgency for transitions toward sustainability. As Karimakar *et al.*, (2013, p. 284) noted recently,

> The islands of the Caribbean share a common set of features that include small size, steep inland topography restricting the land space available for development, and a heavy socio-economic dependence on the coastline and limited resources. These features enhance sensitivity to climate variability so that extreme events such as droughts, floods and hurricanes pose a very real threat to regional development. The threat is likely to be exacerbated under climate change.

In their review of the climate change and Caribbean island communities literature, Kelman and West (2009, p.1) wrote that "the main way forward suggested for the future is better integration of top-down and bottom-up approaches to ensure that data and methods are based on local interests while acknowledging and integrating local and traditional knowledge with other forms of knowledge."

It is this convergent approach that seeks to integrate local culture, interests, and traditional knowledge that we are researching from a psychological and sociocultural perspective at the Caribbean Green Technology Center (CGTC), University of the Virgin Islands. We are exploring what key competencies of attitude and behavior best serve multistakeholder multidisciplinary collaborative initiatives for sustainability, not only in the Caribbean but worldwide. In this regard we are seeking to design and develop the CGTC as a global model for collaboration on community sustainability.

In this paper we present a brief introduction to emerging social science research of collaboration at the Caribbean Green Technology Center (CGTC), University of the Virgin Islands. We provide an initial description of the CGTC as an emergent global model for an idealized collaborative community for the development and implementation of climate change adaptation and transition strategies toward sustainability and sustainable development. We also report on initial research that is seeking to characterize those competencies of attitude and behavior most equitable with collaboration and coordination for sustainability within this model.

2   The Caribbean Green Technology Center, UVI

Comprised of the small islands of St. Thomas, St. Croix, and St. John the U.S. Virgin Islands (USVI) are a Caribbean continental territory of the United States. Very high electricity costs provide an incentive and opportunity to engage the local community, policy makers, and social entrepreneurs with innovators in science and technology, such as engineers, in co-creating economic development, independence from fossil fuels through the development and implementation of knowledge and technology for use reduction and alternative energy sources.

The University of the Virgin Islands' Caribbean Green Technology Center (CGTC) was created in 2011 to advance energy and environmental sustainability in the U.S. Virgin Islands and its neighbors throughout the Caribbean. In the face of severe economic pressures, almost unchecked urbanization and energy and water insecurity, the CGTC will serve as an important balancing force to support the protection of natural resources and the development and implementation of alternative and renewable energy technologies. (Archibald *et al.,* 2011). With the view of establishing vibrant, self-sufficient communities, our vision is for the CGTC to serve as a vibrant intellectual hub for learning, networking and innovation in and across the Caribbean. Participants in the CGTC initiatives including engineers (faculty and from the field), organizational consultants, researchers (faculty and independent), students (UVI multidisciplinary), representatives of government institutions (local and non-local) and faculty from other schools. Participants in the CGTC initiatives operate in a variety of capacities including advisory, student mentorship, applied research, community liaisons and outreach. The CGTC can serve as a model for collaboration and coordination of research and community outreach; linking local and global community perspectives with research and scholarship in the natural, physical, social, and engineering sciences.

In the following sections we describe initial results from ongoing research at the CGTC as well as other field sites that seeks to identify the key competencies for optimal collaboration on sustainability across cultures.

3   Key Competencies for Collaboration on Sustainability

Fortunately, an increasing number of individuals are forwarding initiatives for sustainability. They are variously described in the literature as world benefit leaders, cultural creatives, evolutionary leaders, positive deviants, social entrepreneurs, international social workers, sustainability champions, adaptive network leaders, knowledge managers, transition managers, and boundary managers. Active in a variety of settings from small rural villages to multinational corporations, they are considered key agents for change in public opinion, for example on global climate change (Krosnick, et al., 2006) and key agents for public action, for example by building local capacity rather than encouraging dependency (Bornstein, 2007). In general terms, these individuals can all be regarded as community leaders for sustainability (CLS) because through their personal drive, leadership and management they are all striving toward the achievement of the various criteria (goals, targets, indicators) and driving the social changes necessary for global sustainable development (c.f. Parris & Kates, 2003). Sometimes working in the forefront, sometimes in the background, CLS are the thought leaders and change agents (in their various forms) for

sustainability. CLS are often engaged in action beyond their local communities and institutions, often linking local communities and institutions across cultures and across scales (c.f. Bradley et al., 2009) suggesting that the phenomenon is based in global similarities, that is, shared human attributes, rather than differences. It is the CLS that will likely be most effectual in helping to drive communities toward what are seen as the optimum limits of a community's adaptation to climate change (c.f. Adger et al., 2009). It is the CLS that can serve as a model in our research to understand and optimize those characteristics of individual and social attitude and behavior most equitable with generating sustainable futures.

3.1 Key competencies for sustainability - A psychological and sociocultural perspective

Based on our analysis of the literature related to CLS we were able to initially theorize that behavioral and attitudinal competencies related to the constructs of leadership, connectedness, and resilience may prove important criteria for valid and effective participation in collaborative initiatives for sustainability. The following sections describe the concepts of leadership, connectedness, and resilience as they may relate to the individual characteristics necessary for a transition toward a sustainable future from psychological and sociocultural perspectives.

4   Leadership and Sustainability

How leadership is defined and understood has evolved over time. As described by Alimo-Metcalfe (2013), the current day concept of leadership theory can be recognized as being built on 5 historical stages: a) the trait theory stage that suggested that leadership competence is rooted in innate individual competencies, b) the behavioral stage which focused on how leaders behaved, their so-called leadership style in relation to their followers, c) the context stage which viewed leadership as being contingent on situational factors, d) inspirational/charismatic leadership models that see leaders as those who help build confidence and other capacities to negotiate change in followers, and e) two types of so-called post-heroic models that i) focus on a leaders value base, are termed ethical and authentic leadership models and reflect the public outcry against the recent negative behaviors of corporate leaders such as in the financial markets and elsewhere; and, ii) distributed and shared leadership models in which, as the names imply, leadership emerges through a social process and is either distributed based on roles (in a structured and delegated sense) or enacted depending on the place in an organizations evolution and development process. Anthropologists might argue, however, that these more recent models of collective leadership from organizational studies is not a new phenomenon and have actually been practiced by communities through time based on the earliest records of Australian Aboriginal traditional law and those of contemporary African bands (Sveiby, 2011).

A key element of these models appears to be what can be viewed as the inward versus outward aspects of leadership. In psychological terms, inward aspects like values and integrity reflect what comprises the individual (their individual self) whereas outward aspects (the relational self) concern their interaction with others, for example, as transformational leaders. Notably, these recent models like authentic leadership and transformational leadership have relational elements both with others and with one's self.

Psychological research has helped to understand these more recent social/collective models of leadership. For instance, in self-categorization theory it is proposed that a person's social identity is context dependent and set, largely, by the salience of the sense of belonging to a group (as a group prototype) as confirmed, in part, by feedback from the group to the individual. In the case of leadership it is this dynamic between group and individual that confers the individual as a leader (Haslam et al., 2011).

In our ongoing research we are seeking to determine if there are key competencies in terms of behavior and attitude that help the CLS develop and participate in sustainability initiatives across cultures. To date we have determined that psychological dimensions of leadership as they relate to self and other are important.

4.1 Leadership and Self

Initial results from our literature content analysis indicated that psychological constructs such as self-control (Tangney, et al., 2004), self-perception (White and Hyde, 2012), self-regulation, metacognition, and self-regulated learning (Bolino et al., 2012; Dinsmore et al., 2008) may be seen as early candidates for key competencies of attitude and behavior for sustainability.

Of these we briefly focus on self-control which, refers to the general capacity one has to "manage their lives, hold their tempers...fulfill their promises...persevere at work" (Tangney, et al., 2004, p. 271). The capacity for self-control serves to make appropriate social and personal adjustments so that their is an optimal perceived fit between oneself and one's social environment. High self-control predicts good social adjustment, better relationships, and improved interpersonal skills.

Examples from our CLS interviews of this of self-leadership held at the Caribbean Green Technology Center include statements like:

> "...social justice is something I want to impact, and I really can't do it on the level I am on, so I really need to become a professional. I really need to get my fences in order. And naturally this is how life works. You have to be a certain position in life sometimes to do fully what you want to do. "

4.2 Leadership and Other

One of our research questions is, what leadership attitudes and behavior are best for working with others in collaborative initiatives for sustainability? Initial results from a comparison of interviews and a content analysis of the literature suggest that attitudes and behavior related to what is termed authentic leadership may be ideal. Aviolo et al. (2009) define authentic leadership as "a pattern of transparent and ethical behavior that encourages openness in sharing information needed to make decisions while accepting followers' inputs" (p. 423). Authentic leadership is defined through the psychological constructs of self-awareness transparency, and ethical/moral balanced cognitive processing (Walumbwa et al., 2008).

An example excerpt from our interviews that demonstrates authentic leadership would be:

> "The feedback. I love the feedback. I love the fact that I get to change something. I get to make a difference......The ultimate thing is just to get feedback from the teachers and the students that, "I wanna do this again. This benefited me." So, the fact that I could wake up and benefit somebody else, that makes my day."

5   Connectedness and Sustainability

We take connectedness to refer to the dimensions of cognition, consciousness, and affect one can experience as psychological and sociocultural attachment to nature, other people, and the world at large. In this sense an individuals experience of connectedness can inform and shape their identity (individual and social) and guide their attitudes and behavior. For instance, connectedness to nature has been variously described through research and the development psychometrics including, most recently, the Connectedness to Nature Scale (CNS) (Olivos *et al.,* 2011). We are seeking to capture the optimal dimensions of connectedness not only with respect to the environment but to the broader dimensions related to sustainability.

Our initial research and comparison with the literature suggests that there are several dimensions to the concept of connectedness and its nascent attitudes and behavior as they relate to self and other are key competencies for collaboration between engineers, university students and their communities for sustainable development in the Caribbean, specifically, and initiatives for sustainability, in general.

5.1 Connectedness and Self

We view the attitudes and behavior related to connectedness and self being best described by psychological research through the concepts of mindfulness (Carlson & Brown, 2005), spirituality (MacDonald, 2000), and self-compassion (Neff, 2003). Self-compassion, for example, is manifest through personal dimensions such as self-kindness and common humanity and is not manifest through (self) isolation and over-identifying (Neff, 2003).

5.2 Connectedness and Other

Social connectedness refers to the capacity to build social capital, which is considered by some as a key asset necessary for sustainable communities (Emery & Flora, 2006). After Onyx & Bullen (2000), we consider social connectedness as the capacity to participate in networks, a capacity to trust and build trust, and a proclivity for sociability. We also view compassion for other (Pommier, 2003) as important competency for participation in collaborative initiatives for sustainability.

The following is an interview excerpt demonstrating social connectedness to other:

> "I know discussions between what my vision probably would have been and what others might have been, I think for me, you know....it's been kind of difficult you have to do it to let go of what you think it should be, because it needs to be defined not by one person"

Connectedness and other in terms of compassion was seen in this excerpt:

> "There is a group that I work with after hours and on weekends that our focus is trying to increase recycling and reduction in what we are using on the island and a lot of us, you know, do stuff during the workday for free."

Lastly, here is an excerpt from an engineer who has had a shift in their values/focus/interest in self and has had a greater connectedness to other emerge:

> "I was not very interested in community per se. I was interested in the logic and the science and everything else. Increasingly, you sort of realize that the things that you're trying to do-, or at least I thought that I'm not just interested anymore in the beauty of technology. I can't get excited. I can't get motivated. I can't get passionate just about, "Oh, this is so cool." I always have to think about what it's good for and what kind of impact is it going to have if used in a certain context. So, I've sort of over time become very interested in the human dimension of the sphere that I'm operating in."

6   Resilience and Sustainability

Human resilience in psychological terms has been described as "sustainability of purpose in the face of stress, and recovery from adversity" (Zautra, Hall, & Murray, 2008, p. 41). Zautra (2009) argued that recovery and sustainability in resilience are not mutually exclusive. Instead, they act as a dynamic toward biopsychosocial homeostasis (i.e., a return to a more balanced state following an acutely stressful experience). Importantly, however, he also argued that recovery following stress is characterized by automaticity, whereas sustainability "depends on unique human capacities for appraisal, planning and intentional action . . . awareness, identity, and choice characterize the development of sustainable human values and purposes" (Zautra, 2009, p. 1936). This description appears similar to those of other authors describing self-regulation as a key component of resilience during crisis and adversity; that is, the capacity to cope with problems through the self-control of thought, emotions, and behavior and to remain goal-directed, reflective, and purposeful in actions (Buckner, Mezzacappa, & Beardslee, 2003; Karoly, 1993).

6.1 Resilience and Self

We see the work of Chesney et al., (2006) in coping and self-efficacy as providing a promising description of the type of resilience related to self that could serve as a key competency for participation in sustainability initiatives. Coping self-efficacy refers to the measurement of any changes in self-confidence one is experiencing in relation to their perceived ability to cope to stressful events. Similarly the psychological research on self-efficacy beliefs (Zimmerman, 2000) as an indicator of persistence and motivation to learn is also promising in this regard.

6.2 Resilience and Other

Whereas resilience and self is related to attitudes and behaviors directed inward, we view the resilience and other group of competencies as those related to manifesting outward success in the face of and despite adversity. Two promising descriptions of outward resilience and other are the description of mental toughness by Clough et al., (2002) and the description of creative achievement (Carson et al., 2005). Mental toughness, for example, refers to a person's change orientation (the extent to which challenges are perceived as opportunities), their life and emotional control (may overlap somewhat with leadership-self), commitment to stay with a task despite adversity, and outward optimism and interpersonal assertiveness.

An example of this type of resilience competency may be illustrated through the following interview excerpt:

> "It tends to be such that for a range of reasons, in the end the types of things that end up being done aren't really necessarily what's the best in the long term in the community, but more by short-term funding needs in a lot of cases because somebody has determined that XYZ problem exists and they want to put some money into it, and the people that are there pay money for these opportunities. They'll say, "Yeah. Okay. Let's do this." In the end in terms of being able to really coordinate a vision for how they want to operate and be and then being able to negotiate on their own terms how things should be run, I think that's still very lacking. So, maybe to even better define the activity of the work that I'm into at the moment is finding better ways to be an interloper and shift that dynamic a little bit."

Resilience in terms of commitment and change orientation was found in the following excerpt:

> "Well, as much as we do discuss sustainable energy and alternative energy and different ways to help people, a lot of times even though you do have the funding, there might be legislation in place that kinda puts people back. So, even though you get people to step forward and educate them on different things, there might be legislation in place that they can't go off the grid or – you know what I mean? So, I would say sometimes the government pushes back, but we're working with them as well."

7   The Sustainable Futures Protocol: A New Chapter in Education for Sustainability

Concurrent with our efforts to identify key competencies for optimum collaboration in sustainability initiatives, we are starting research of how to best develop these competencies as part of an education for sustainability program. As a working title we call this vehicle for self/other competency development for sustainability initiatives the Sustainable Futures Protocol (SFP). Our intention for the SFP is that it will serve as an adjunct to Education for Sustainability (ESD) for the development of the individual and social competencies most equitable with participating in initiatives for sustainability. Early research reveals that the best structure of the SFP is one that is framed by a diversity of inputs and density of ideas; fosters a sense of belonging to community, while the optimal collaborative dynamic is one that is an evolutionary research-based hermeneutic-like inquiry.

8   Discussion

Based on our research it appears that Community Leaders for Sustainability (CLS) share many similarities in terms of some of the attitudes and behavior (individual (self) and social (other) competencies) that may be most effective for participation in community-based sustainability initiatives.

In our work to date, we have identified attitudes and behaviors related to leadership, connectedness, and resilience can serve as key competencies for effective collaboration and coordination in sustainability initiatives. We are beginning to develop a learning protocol, the SFP mentioned above, that can serve as an adjunct to education for sustainability programs to optimize these key competencies.

8.1 Future Research

At this point in our progress, small sample size and limiting early study design restrict the extension of inferences from our research. In this paper we have attempted to introduce our ongoing psychological and sociocultural inquiry of the key competencies of attitude and behavior for those engaged in initiatives for sustainability; as a case study we described these competencies as revealed by members of the CGTC at the University of the Virgin Islands.

Through social science research of the collaboration between engineers and their communities, as is occurring at the CGTC, we foresee the opportunity to discover and optimize a variety of competencies related to collaboration and coordination of action in initiatives for sustainability. As described in this paper we are particularly interested in further researching the key competencies related to leadership, connectedness, and resilience. We are also beginning to study how these competencies might be best developed through a novel learning vehicle we call the Sustainable Futures Protocol (SFP). We believe these competencies will serve engineers, social scientists, university students and others as they participate as community educators, liaisons, and facilitators for improved negotiation, decision making, and action for sustainable development worldwide.

References

Alicke, M. D., & Sedikides, C. (2009). Self-enhancement and self-protection: What they are and what they do. *European Review of Social Psychology*, **20(1),** 1-48.

Alimo- Metcalfe, B. (2013). A Critical Review of Leadership Theory. *The Wiley-Blackwell Handbook of the Psychology of Leadership, Change, and Organizational Development*, 13-47.

Amiot, C. E., De la Sablonnière, R., Terry, D. J., & Smith, J. R. (2007). Integration of social identities in the self: Toward a cognitive-developmental model. *Personality and Social Psychology Review*, **11(4),** 364-388.

Aviolo, B. L., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: Current theories, research, and future directions. Annual Review of Psychology, **60,** 421-449.

Bai, X., Wieczorek, A.J., Kaneko, S., Lisson, S. & Contreras, A. (2009). Enabling sustainability transitions in Asia: The importance of vertical and horizontal linkages. *Technological Forecasting & Social Change, 76,* 255-266.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological bulletin*, **117(3)**, 497.

Bechtoldt, M. N., De Dreu, C. K., Nijstad, B. A., & Zapf, D. (2010). Self- Concept Clarity and the Management of Social Conflict. *Journal of personality*, *78(2)*, 539-574.

Brooker, R., Macpherson, I., & Aspland, T. (2001). Enriching the outcomes of action research: Connecting the local with the global through a hermeneutic spiral. *Queensland Journal of Educational Research*, **17(1)**, 16-28.

Brewer, M. B. (1991). The social self: On being the same and different at the same time. *Personality and Social Psychology Bulletin*, **17(5),** 475-482.

Brewer, M. B., & Gardner, W. (1996). Who is this" we"? Levels of collective identity and self representations. *Journal of personality and social psychology*, **71,** 83-93.

Brown, B. C. (2012). Leading complex change with post-conventional consciousness. *Journal of Organizational Change Management*, **25(4)**, 560-575.

Campbell, J. D., Trapnell, P. D., Heine, S. J., Katz, I. M., Lavallee, L. F., & Lehman, D. R. (1996). Self-concept clarity: Measurement, personality correlates, and cultural boundaries. *Journal of Personality and Social Psychology*, **70(1),** 141.

Camillus, J. C. (2008). Strategy as a wicked problem. *Harvard Business Review*, **86(5)**, 98-101.

Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, validity, and factor structure of the Creative Achievement Questionnaire. *Creativity Research Journal*, **17(1)**, 37-50.

Clark, W. C., & Dickson, N. M. (2003). Sustainability science: the emerging research program. *Proceedings of the National Academy of Sciences*, **100(14)**, 8059-8061.

Clough, P., Earle, K., & Sewell, D. (2002). Mental toughness: The concept and its measurement. *Solutions in sport psychology*, 32-43.

Crompton, T., & Kasser, T. (2009). *Meeting environmental challenges: The role of human identity* (pp. 1-93). Godalming, UK: WWF-UK.

Deci, E. L. & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry,* **11,** 227-268.

Dovidio, J. F., Gaertner, S. L., & Saguy, T. (2009). Commonality and the complexity of "we": Social attitudes and social change. *Personality and Social Psychology Review*, **13(1)**, 3-20.

DuPuis, E. M., & Ball, T. (2013). How not what: teaching sustainability as process. *Sustainability: Science, Practice, & Policy*, **9(1),** 64-75.

Eccles, J. (2009). Who am I and what am I going to do with my life? Personal and collective identities as motivators of action. *Educational Psychologist*, **44(2)**, 78-89.

Flora, C. & Flora, J. (2008). *Rural communities: Legacy and change* (3rd Ed.). Boulder, CO: Westview Press.

Foresight Future Identities (2013). *Changing identities in the U.K.: The next 10 years.* Final Project Report. The Government Office for Science, London.

Gaertner, L., Sedikides, C., & O'Mara, E. (2008). On the motivational primacy of the individual self: 'I' is stronger than 'We'. *Social and Personality Psychology Compass*, **2,** 1913-1929.

Gaertner, L., Sedikides, C., Luke, M., O'Mara, E. M., Iuzzini, J., Jackson, L. E., ... & Wu, Q. (2012). A motivational hierarchy within: Primacy of the individual self, relational self, or collective self?. *Journal of Experimental Social Psychology,* **48,** 997-1013.

Hammack, P. L. (2008). Narrative and the cultural psychology of identity. *Personality and Social Psychology Review,* **12,** 222–247.

Hamilton, C. (2010). Consumerism, self-creation and prospects for a new ecological consciousness. *Journal of Cleaner Production,* **18,** 571-575.

Handley, K., Sturdy, A., Fincham, R. & Clark, T. (2006). Within and beyond communities of practice: Making sense of learning through participation, identity and practice. Journal of Management Studies **43,** 641-653.

Haslam, S.A., Reicher, S.D., & Platow, M.J. (2011). *The new psychology of leadership: Identity, influence, and power.* New York: Psychology Press.

Hastrup, K., & Olwig, K. F. (Eds.). (1996). Siting culture: The shifting anthropological object. New York: Routledge.

Hayes-Conroy, J. S., & Vanderbeck, R. M. (2005). Ecological identity work in higher education: Theoretical perspectives and a case study. *Ethics, Place & Environment,* **8,** 309–329.

Hitlin, S. (2003). Values as the core of personal identity: Drawing links between two theories of self. *Social psychology quarterly*, 118-137.

Hornsey, M. J., & Jetten, J. (2004). The individual within the group: Balancing the need to belong with the need to be different. *Personality and Social Psychology, 8,* 248–264.

Juárez-Nájera, M., Rivera-Martínez, J. G., & Hafkamp, W. A. (2010). An explorative socio-psychological model for determining sustainable behavior: Pilot study in German and Mexican Universities. Journal of Cleaner Production, 18(7), 686-694.

Karmalkar, A. V., Taylor, M. A., Campbell, J., Stephenson, T., New, M., Centella, A., ... & Charlery, J. (2013). A review of the observed and projected changes in climate for the islands in the Caribbean. *Atmósfera*, **26(2**), 283-309.

Kelman, I., & West, J. J. (2009). Climate change and small island developing states: a critical review. *Ecological and Environmental Anthropology*, **5(1),** 1-16.

Kirschner, S. R., & Martin, J. (2010). *The Sociocultural Turn in Psychology: The Contextual Emergene of Mind and Self.* New York: Columbia University Press.

Lans T, Blok V, & Wesselink R., (2013). Learning Apart and Together: Towards an Integrated Competence Framework for Sustainable Entrepreneurship in Higher Education. *Journal of Cleaner Production,* doi: 10.1016/j.jclepro.2013.03.036.

Larsen, J.N., Schweitzer, P., & Fohndal, G. (2010) (Eds.). *Arctic social indicators: A follow-up to the Arctic human development report .* Copenhagen, Denmark: National Council of Ministers.

Laszlo, K. C. (2012). From systems thinking to systems being: The embodiment of evolutionary leadership. *Journal of Organisation Transformation & Social Change*, **9(2),** 95-108.

Lawrence, D. M., Slater, A. G., Tomas, R. A., Holland, M. M., & Deser, C. (2008). Accelerated Arctic land warming and permafrost degradation during rapid sea ice loss. *Geophysical Research Letters*, **35(11**), L11506.

Leiserowitz, A. A., Kates, R. W., & Parris, T. M. (2006). Sustainability values, attitudes, and behaviors: A review of multinational and global trends. *Annual Review Environmental Resources.*, **31,** 413-444.

Miller, T. R. (2012). Constructing sustainability science: emerging perspectives and research trajectories. *Sustainability Science*, 1-15.

Mitchell, R. B., Clark, W. C., Cash, D. W., & Dickson, N. (2006). (Eds.). *Global environmental assessments: Information and influence.* Cambridge, MA: MIT Press.

Murtagh, N., Gatersleben, B., & Uzzell, D. (2012). Multiple identities and travel mode choice for regular journeys. *Transportation Research Part F: Traffic Psychology and Behaviour*, **15(5),** 514-524.

Olivos, P., Aragonés, J. I., & Amérigo, M. (2011). The connectedness to nature scale and its relationship with environmental beliefs and identity. *Internacional Journal of Hispanic Psychology*, **4,** 5-19.

Onyx, J., & Bullen, P. (2000). Measuring social capital in five communities. *The Journal of Applied Behavioral Science*, **36(1),** 23-42.

Orr, D. W. (1992). *Ecological literacy: Education and the transition to a postmodern world*. New York: Suny Press.

Pirages, D.C. (1994). (Ed.). *Building Sustainable Societies.* New York: ME Sharpe.

Ratner, B. D. (2004). "Sustainability" as a Dialogue of Values: Challenges to the Sociology of Development. *Sociological Inquiry*, **74(1),** 50-69.

Roccas, S., & Brewer, M. B. (2002). Social identity complexity. *Personality and Social Psychology Review*, **6(2),** 88-106.

Safarzyńska, K., Frenken, K., & van den Bergh, J. C. (2012). Evolutionary theorizing and modeling of sustainability transitions. *Research Policy, **41,** 1011-1024.

Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology. An Introduction. American Psychologist, 55(1), 5-14.

Soron, D. (2010). Sustainability, self- identity and the sociology of consumption. *Sustainable Development*, **18(3)**, 172-181.

Sveiby, K-E. (2011). Collective leadership with power symmetry: Lessons from Aboriginal prehistory. *Leadership, **7,** 385–414.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades and interpersonal success. *Journal of Personality, **72,** 271-324.

VandenBos, G. R. (2007). *APA dictionary of psychology.* Washington, D.C.: APA

Verharen, C., Tharakan, J., Bugarin, F., Fortunak, J., Kadoda, G., & Middendorf, G. (2013). Survival Ethics in the Real World: The Research University and Sustainable Development. *Science and Engineering Ethics*, April, 1-20.

Viederman, S. (1994). Sustainability's Five Capitals and Three Pillars. In Pirages, Dennis, C. (Ed.). *Building Sustainable Societies.* New York: ME Sharpe.

Wals, A. E., & Jickling, B. (2002). "Sustainability" in higher education: From doublethink and newspeak to critical thinking and meaningful learning. *International Journal of Sustainability in Higher Education*, **3(3)**, 221-232.

Walumbwa, F. O., Avolio, B. J., Gardner, W. L., Wernsing, T. S., & Peterson, S. J. (2008). Authentic leadership: Development and validation of a theory-based measure. *Journal of Management, 34,* 89-126.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity.* Cambridge, U.K.: Cambridge University Press.

Wenger, E. (2000). Communities of practice and social learning systems. *Organization, 7,* 225- 246.

Wensing, E.J. (2012). *A social science research protocol for the assessment and development of community leaders for sustainability and sustainable communities.* 127 pages. Saybrook University Doctoral Dissertation: Proquest 3541444.

Wensing, E.J. (2013). The Global Sustainability Inventory: Toward a quantitive assessment tool for the attitude and behaviour most equitable with a sustainable global future. (*manuscript in preparation)*

White, K. M., & Hyde, M. K. (2011). The Role of Self-Perceptions in the Prediction of Household Recycling Behavior in Australia. *Environment and Behavior*, 44(6) 785–799.

Wiek, A., & Iwaniec, D. (2013). Quality criteria for visions and visioning in sustainability science. *Sustainability Science*, 1-16. DOI 10.1007/s11625-013-0208-6

Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science*, *6,* 203-218.

Wilkinson, R., & Cary, J. (2002). Sustainability as an evolutionary process. *International journal of sustainable development*, *5*(4), 381-391.

Wood, J. V. (1989). Theory and research concerning social comparisons of personal attributes. *Psychological bulletin*, *106*(2), 231.

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary educational psychology*, *25*(1), 82-91.