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Was the Copenhagen Summit doomed from the start? Some insights from Green IS research

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ABSTRACT

At the 2009 Copenhagen Summit on Climate Change, COP15, so many contradictory demands were apparent that it is doubtful whether it produced many useful outcomes. In this paper we question whether it, and summits like it, may be inherently doomed to fall short of expectations. With its experience of the intrinsic contradictions within socio-technical systems, the Information System's profession may provide some insights into complex issues such as climate change. IS research has often demonstrated that imposed top-down solutions rarely provide the most promising way to approach highly complex problems. On the other hand, bottom-up emergent processes, though less politically acceptable, may take us in the direction we need to go. This paper reviews and reports Green IS research to make a case for a multifaceted approach to the climate change problem, with the suggestion that the IS experience may inform global approaches to finding bottom-up solutions to climate change.

Keywords

Sustainability, Climate Change, Green IS, socio-technical systems

INTRODUCTION

It is generally agreed that the Copenhagen Summit on Climate Change, COP15, fell short of expectations. While an accord was reached, it was reported that the "Copenhagen deal falters as just 20 countries of 192 sign up to declare their climate change strategies"[1]. We therefore ask: is it possible to have a one-size fits all solution to a complex/wicked problem such as climate change which has inherent contradictions?

As anticipated from previous efforts, the Copenhagen Accord focuses on targets and measures for Green-House Gas (GHG) emissions to keep global temperature increases below 2 degrees Celsius as recommended by the science. This approach implies schemes, audits, incentives, compliance, regulations etc that are difficult enough to implement at national levels let alone internationally. In this paper we refer to this as the top-down approach. The Accord does go on to emphasize the special needs of vulnerable island nations and least developed countries. Tackling climate change at the local we refer to as a bottom-up approach.

The first paragraph of the Copenhagen Accord declares a "strong political will to combat climate change in accordance with the principle of common but differentiated responsibilities and respective capabilities". This statement reveals the inherent contradiction between what can be done in common at the top global level and the different realities at the bottom local level. This paper aims to take a balanced view of how to deal with this and other contradictions inherent to climate change challenges. It should be noted that, while the authors represent two 'western' developed countries, there are different imperatives and contradiction both within and between these counties.

In this paper we articulate through examples why we believe that high-level global meetings and accords will inevitably fall short of expectation because of the inherent contradictions. We bring the IS experience of lessons learnt from many systems failures to demonstrate that top-down solutions, although desirable and useful, are rarely the most promising way to approach highly complex problems. In contrast, bottom-up emergent processes, while less politically acceptable, contain the potential for effective, lasting change. As evidence for this we will describe large scale, top-down Green IT research and contrast it with the bottom-up work of the authors and others. We use

[1] http://www.guardian.co.uk/environment/copenhagen

this to make a case for a multifaceted approach to the climate change problem in respect of our discipline of IS and suggest that this IS insight may inform all aspects of the climate change debate.

BACKGROUND

Problem solving approaches can be described as top-down (ordered) v bottom-up (unordered – emergent). Wicked or complex problems have ill-defined, shifting definitions and conflicting elements that belie solution although some resolution is possible through a holistic perspective (Rittel & Webber 1973). Wicked problems do not respond to top-down solutions. This is not unlike the record of failures of IS projects in large distributed organizations who try to implement enterprise systems.

Here are some examples that illustrate the inherent contradictions that make up the climate change problem:

- The phenomenon known as "carbon leakage," where a decline in emissions from a developed country leads to an increase in emissions from a country with weaker environmental standards. For example, while China is now the world's largest producer of CO_2, this is in part due to the energy requirements of production of goods bound for US and European markets (Pan, Phillips, & Chen, 2008)
- A transition in the US from gasoline to electric vehicles could ***increase*** CO_2 emissions, because half of US electricity is produced by coal
- Water, a scarce resource in itself, is essential to the production of energy, and energy is essential to the production of clean water (W. D. Jones, 2008)
- In Australia, the government's attempt to introduce a bill for an Energy Trading Scheme (ETS) through a hostile upper house has had to incorporate so many amendments to appease the coal industry that it is now probably too weak to be worth the effort.

Information systems success and failure have been much discussed in the IS literature (e.g. DeLone & McLean 1992). IS thus has credentials in this space for understanding the pitfalls of top-down design. It is interesting to note that the largest information system ever, the Internet, grew through an emergent process, and it is Global yet has a bundle of contradictions (security versus openness etc).

THE TWO DIRECTIONS OF GREEN IT/IS

The Green IT/IS literature is just emerging and taking two paths:

The first path is traditionally top-down, survey-based that looks for common trends, relationships, and measures from a large homogenous cohort of respondents. This is useful for setting targets for energy use reductions, treatment of e-waste in organizations, industries etc and applies to mainstream Green IT with a limited agenda e.g. to reduce the Carbon Footprint of IT in specific area.

The second path is more bottom-up and situated - focused not only on reducing the impact of IT but on the ways information systems can be used to help everyone reduce their carbon footprint in a cost effective and socially acceptable manner. Here is a brief summary of the research done following these two approaches.

Top-down research and what it contributes

Initial Green IT studies are empirical survey and interview research establishing basic entities in the field and relationships between them. This has been useful in scoping the area although limited to those entities prescribed by the researchers. Elliot (2007) identified competitive, legal and social responsibility dimensions of motivational elements influencing Green IT within organizations. Sayeed and Gill (2008) identified the main reasons given for supporting Green IT were cost cutting and energy conservation. An empirical study by Kuo and Dick (2009) suggests that Green IT efforts are motivated by employees' sense of social responsibility within organizations that have the capability to adapt rather than by issues of economics and technologies. Molla (2008) developed a Green IT Adoption Model that identifies economic, regulatory and ethical drivers of Green IT. Elliot and Binney's (2008) work suggests government reporting, regulation and customer demand are potential drivers for Green IT and found that responsiveness to staff concerns and client requirements also led to engagement with Green IT (Elliot & Binney 2008). Molla, Pittayachawan and Corbitt (2009) have produced comparative data on Green IT and organizational sustainability. They identified energy efficiency and cost cutting as the primary consideration of US organizations, whereas organizations in Australia and New Zealand seem to be primarily motivated by environmental considerations.

Other studies concern the positive impact of Green IT on social, environmental and economic indicators in organizational systems (Velte et al 2008; Caldille & Parmigiami 2004), in e-business (Yi & Thomas 2006) and across the supply chain (Rao & Holt 2005). A cross organizational consultancy study by Phillipson (2009) is developing a Green IT Readiness Index, focusing on five key areas: End User Efficiencies, Enterprise IT Efficiencies, Lifecycle and Procurement, Measuring and Monitoring, and Enabling the Business. This draws on the concept of e-readiness indicators (Molla & Licker 2005; Berthon et al 2008).

Bottom-up research exploring theoretical frameworks for Green IS

An emerging collection of IS research is using existing models in light of local experience to develop new frameworks applicable to Green IS studies. We view this as a bottom-up endeavor. Fernandez et al (2008) developed an innovative project management framework to support and coordinate a project to extract oil from green algae. Chen et al (2008) have developed an insightful conceptual model that clarifies the roles of IS in the pursuit of ecological sustainability. They aim to show how, under different institutional pressures, IS can be leveraged to achieve eco-efficiency through automating, eco-equity through information flows and eco-effectiveness through organizational transformations. Daly and Butler (2009) take an IS perspective using Institutional Theory to derive theoretical propositions which specify the effect that regulatory, normative and cultural-cognitive elements have in shaping environmental responsibility in organizations.

Bottom-up research exploring localized Green IT practice

Papers from the Workshop on Ubiquitous Sustainability (Hasbrouck et al 2007) presented emerging practices involving innovative but often quite simple systems to influence behavior towards greener activities. These included ways to sense and display carbon emitting events in the home (LeBlanc 2007; Brush 2007; Stringer et al 2007), at the office (Bray 2007) and in the town (Hooker et al 2007; Ljungblad 2007). Greener actions and uses of technologies were shown to increase by providing information incorporated in stories (Oehlberg et al 2007) and by playing games (Millecevic 2007).

These bottom-up approaches contrast with top-down traditional empirical research, which looked to establish global entities and generalized relationships between them. This paradigm is similar to efforts towards global agreement on measures and targets determined from top-down processes such as COP15. The bottom-up research recognizes the complexity of the area and either moves to a more abstract level to create theory-based frameworks, or more practical localized IT based activities that influence individual or group behaviors.

Our proposition is that the top-down approach taken by the politicians in Copenhagen – the goal of simple, globally applicable solutions – is probably inherently impossible to achieve because of all the conflicting local demands. We also recognize that a local bottom-up approach is a real challenge at the global level due to conflicting requirements – the issues of fairness, of assessing progress, of using carrots and sticks, maybe letting people set their own targets and programs as long as these are open, approved and monitored.

THE CASE FOR A MULTIFACETED APPROACH TO THE PROBLEM OF CLIMATE CHANGE

Progress requires solutions that embrace the contradictions of both top-down and bottom-up approaches. For example, the artist Michael Singer brilliantly engages the community bottom-up by applying design to top-down infrastructure for environmental projects. Singer's designs turn waste processing facilities into beautiful additions to a community (Singer, 2010). Figure 1 is a picture of a Solid Waste Transfer and Recycling Facility Singer designed for Phoenix, Arizona in 1993. It won numerous design awards, transforming an "out of sight, out of mind" facility into an attractive part of the city landscape. This innovative design for a waste facility created political capital that allowed Phoenix to develop other environmental projects in cooperation with, rather than in conflict with their citizens (Singer, Cruz, & Bregman, 2007).

One bottom-up contribution from Green IS can come from the viral power of networked advocacy using social media tools, as demonstrated by the election of Barack Obama (Lutz, 2009), and the rapid solicitation of donations in response to the January 2010 earthquake in Haiti (Bunz, 2010).

Figure 1: Solid Waste Transfer and Recycling Facility, Phoenix, Arizona, 1993

Social media's power is being noted as an agent of political change. A survey indicated that 62% of Americans polled believe they can influence business decisions by voicing opinions via new media (Loechner, 2010). An example of social media's application for climate change advocacy is the use of Twitter to promote Earth Hour (https://www.myearthhour.org/home), a global orchestrated event where people turn off their lights for one hour. The Earth Hour event was #9 on the list of top news events for Twitter for 2009 (Chowdhury, 2010).

While bottom-up approaches are finding traction and influence, many parts of the sustainability puzzle must be addressed from a top-down, systems level perspective. Supporting sustainability requires a considerable recalibration of economic incentives. Current energy pricing favors lowest first cost rather than total life cycle cost of use. While the initial cost of coal is dramatically less than renewable sources, its secondary costs are substantial. Coal emits more CO_2 relative to its energy density than other fuels, and leaves behind mounds of toxic ash (Kosugi et al., 2009). As long as coal's environmental damage is treated by energy markets as an economic externality, meaning something outside the expected costs for a transaction, then decisions will be made on the basis that fossil fuel is cheaper than renewable sources.

The theory of bounded rationality (Simon, 1955) argues that the ability to make fully informed decisions is limited by both the knowledge and computational capacity of the person making the decision. Instead, research by social scientists suggest that when people face complex problems they apply heuristics, a particularly bottom-up process, that derive from culture and social norms (Carey & Burkell, 2009). So we need to look for methods to influence behavior in complex socio-technical systems. This will require considering work in the IS domain, especially that related to socio-technical systems theory, and looking for evidence of efforts that change attitudes and behaviors. We now report on two recent Green IS studies, one in Australia and one in the US, that provides some of this evidence.

BOTTOM-UP STUDIES TO GATHER PERCEPTIONS AND ATTITUDES

Eliciting the Perceptions of IS Professionals

Threats to the sustainability of the planet are the concern of everyone and meeting these threats is more than just doing the science, reducing waste and creating alternative sources of energies. Much of the progress may come from understanding the diverse needs, opinions and attitudes of people everywhere and having the leadership, political and public support to coordinate multiple solutions at global, national and local levels.

This study aims to increase the understanding of how IT and IS professionals perceive the confusing array of elements in the challenges posed by climate change and how they could use their particular skills and knowledge to

be part of the solution. A Q-method study was used to gather and analyze the subjective views of a group of IS professionals on this question:

> *Which technologies, systems and applications offer the greatest opportunity in solving problems concerned with the environment?*

Q-method is particularly suitable for the study of topics having complex ramifications that are not yet well understood. It can uncover the *range* of views, attitudes, opinions, understandings, and experiences on a specific topic of investigation, as opposed to most methods that offer one composite view (Brown 1986). A Q-sample of 20 to 50 participants has the ability to produce meaningful results i.e. provide an accurate picture of the range of views on a topic (McKeown & Thomas 1988).

Although a comprehensive report of this study is not yet published, it is used here to illustrate the value of conducting such studies to draw out the human motivations that can be leveraged to find new solutions to complex problems and be more aware of how these will work in practice where green initiatives require public support. To conduct this study, we put together a multi-disciplinary reference group of 20 participants from among academic staff and graduate students at our university who were familiar with IS and/or ICT and concerned with green issues. The study is summarized as follows:

Phase 1: the Q-Concourse: A sets of statements, representing all possible views on the topic that the group could imagine, were elucidated through several meetings of the participants and through circulating the growing sets of statement by email. By this evolutionary process, duplicate statements were eliminated and the wording of some clarified. Examples of the 35 statements collected on the topic are shown in Table 1.

Phase 2. the Q-Sorts: The individuals who participated in the concourse, together with three other IS academic staff, were invited to do the sort making a total of 23 participants. Each participant was given a set of numbered cards containing all 35 statements and is asked to rank them all on the grid shown in Figure 1 as follows:

> Rank these statements on the way you would prioritize these technologies, systems, initiatives, processes etc for implementation taking into account both their positive impact on the environment (reduction in carbon foot-print etc) and their ease of implementation (cost, acceptance etc) i.e. their position as "low hanging fruit".

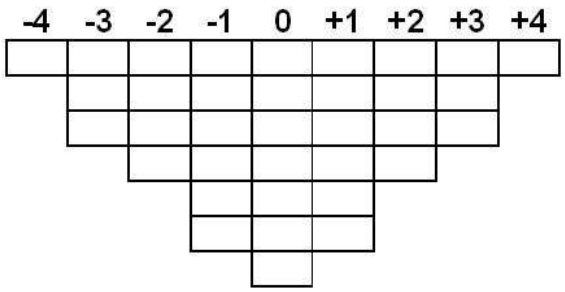

Figure 1: **A Q-Sort Triangle for the 35 Statements (one cell per statement): top priority to the right, with no distinction vertically.**

A factor analysis was performed using standard Q-method software on the set of 23 sorts. This gives Factors that are clusters of those participants who appear to hold similar views in their ranking of the statements, particularly the few statements ranked highest and lowest.

Here a 2-Factor solution emerged as follows:

Seven participants fell on Factor 1 which placed *Telecommuting* and *Teleconferencing* as top choices for technologies with positive impact on the environment and practicalities of implementation. Their lowest ranked choice was RFIDs and other embedded devices.

Factor 2 was a confounded Factor and so really consists of 2 Factors with opposing views. 5 participants fell on Factor 2a which gave the following statements high ranking: *systems for optimization of CO_2 emissions*; *long-term monitoring of climate to quantify the changes*; *long-term predictions of capturing carbon from atmosphere and storing it*; *optimization technologies for efficiencies of systems (transport etc)*; and *global and regional climate modeling*. This group ranked the statement *visualization of information* the lowest. 1 person on Factor 2b (a mature aged undergraduate student) had the completely opposite ranking, i.e. their top choice was *visualization of information.*

In contrast to the Factors, Table 1 shows consensus statements that most participants ranked as a priority.

Table 1 Consensus Statements ranked positively by most people

Statements
Holistic business process enhancement
Virtualization of collaborative technologies
Simulation modelling for sustainable enterprise and development
Guidelines for ICT procurement/purchasing
Systems for optimization of IT quality

This study shows that, even within a relatively small specialized group, there are contradictory but legitimate views on where our profession could begin our assault on the problem of climate change.

Eliciting the perceptions of US undergraduate students

This section describes a project to develop sustainability curriculum for US undergraduates. Since the US is the biggest global consumer of energy (Smil, 2006, p. 11), reducing the individual energy choices by its consumers can greatly diminish CO_2 emissions.

Methods to alter US energy consumption practices can be adapted from efforts to change self-destructive habits such as smoking cigarettes or drug use. Health professionals have found that ambivalence towards self-destructive behavior and its consequences has great influence (Miller & Rollnick, 2002). People engaging in self-destructive behavior will agree that change is important, but show real resistance when called upon to modify their lifestyle. Paradoxically, exposure to increasingly negative consequences can prevent change by immobilizing the person, even making their behavior worse (Miller & Rollnick, 2002, p. 17). Instead, "constructive behavior change seems to arise when the person connects it with something of intrinsic value, something important, something cherished," (Miller & Rollnick, 2002, p. 12).

The pivotal role of ambivalence with respect to sustainability was the main finding of a three year Green IS project to develop sustainability curriculum materials for US undergraduates. While it seems outrageous to compare students who do not recycle to those addicted to drugs, the role of ambivalence as an obstacle to changing sustainability practices is quite similar. Developing techniques to combat ambivalence, and avoiding anxiety provoking methods when discussing climate change were found to be the most effective way to encourage progress in sustainable behavior.

These materials were included as coursework for an Introduction to Computing class, taught in seven sections over six semesters by the same instructor. Students completed a pre- and post-course survey regarding their sustainability attitudes and behaviors, with measures adapted from the New Environmental Paradigm (NEP), (Dunlap, Liere, Mertig, & Jones, 2000), and Environmentally Responsible Behavior (ERB), (Smith-Sebasto & D'Costa, 1995).

The instructor found that sustainability attitudes moved along a continuum from denial, to ambivalence, to agency and self-efficacy. Early in the project it became clear that emotional or distressing content about climate change blocked engagement with the complexities of sustainability. More effective outcomes came when positive benefits of sustainable behavior were emphasized, such as lower expenses, simpler lifestyle choices, and opportunities for careers in 'green' jobs.

Measures from the NEP were used to capture three clusters of attitudes towards sustainability, that we label here as "**Denial**," "**Anxiety/Ambivalence**," and "**Agency/Self-Efficacy**." Each measure is a seven point semantic differential scale, from 1 (Strongly Disagree) to 7 (Strongly Agree). The measures for these attitudes are as follows:

- **Denial**: "The so-called ecological crisis facing humankind has been greatly exaggerated."
- **Anxiety/Ambivalence**: "When humans interfere with nature it often produces disastrous consequences."
- **Agency/Self-Efficacy**: "We must take stronger measures to conserve our nation's resources."

Pre-course results show the Denial cluster was the most influential attitude (see Tables 2 and 3). It significantly correlated with 11 out of 15 measures, influencing actions ***against*** environmentally responsible behavior. The Anxiety/Ambivalence cluster was the ***least*** influential attitude in the pre-course surveys, significantly correlating with only three out of 15 measures. Just like the negative effect of anxiety on the ability of people to change their smoking habits (Miller & Rollnick, 2002), in pre-course results anxiety did not result in efforts to support sustainability. The Agency/Self-Efficacy cluster had the highest mean for all three measures, with a value of 5.79. It significantly correlated with seven out of 15 measures.

Post-course results show an increase in the positive influence of both the Anxiety/Ambivalence and the Agency/Self-Efficacy clusters, and a sharp decrease in the negative influence of the Denial cluster (from 11 to only 1). The Anxiety/Ambivalence cluster significantly correlates with nine measures, up from three in the pre-course survey. The Agency/Self-Efficacy cluster has nine significant correlations in the post-course survey, up from seven in the pre-course survey.

These results illustrate that motivating people for change is a complex process, with outcomes that seem counter-intuitive. For example, students reporting high levels of anxiety about sustainability were rather tepid about recycling, with only 28% reporting they always recycle. Here we see anxiety blocking engagement with sustainable lifestyle changes. The negative effect of anxiety has to become more widely recognized and countered, because the media portrays climate change as a version of the apocalypse. Discussions with disaster themes interfere with encouraging sustainability. In contrast, our work found that curriculum materials that focused on the pragmatic necessity and benefits derived from sustainability had a more positive impact on promoting pro-environmental behavior.

CONCLUSIONS AND FUTURE RESEARCH

The decision making at the 2009 Copenhagen Summit on Climate Change appeared to be predominantly top-down with a desire for globally acceptable objectives, targets and measures. This paper has presented a summary from the emerging Green IS literature that suggests a top-down approach, though of some value, is limited when faced with a complex issue such as climate change where so many contradictory demands are apparent. The IS experience of the intrinsic contradictions in socio-technical systems may provide useful insights into bottom-up solutions to complex issues of climate change. This approach recognizes the complexity of the area and leads to practical localized activities that recognize and influence individual or group behaviors. The Copenhagen Accord hints at this in one of its decisions to "pursue various approaches, including opportunities to use markets, to enhance the cost effectiveness of, and to promote mitigation actions".

The two main studies described in this paper focus on bottom up approaches. These studies demonstrate how people can have legitimate but conflicting attitudes and views on how to combat climate change and what may be a contradictory relationship between these attitudes and actual behaviors. This is important both in the way individuals act in regard to their own impacts on the environment and in their collective influence through advocacy on government decision.

In this paper we question whether Global Summits with too much focus on uniform agreement are inherently doomed to fall short of expectations. We propose that Green IS research should make a case for a multifaceted approach to the climate change problem, including bottom-up solutions through our domains of IT and IS particularly through the use of social media. This may not lead to one uniform solution but rather suggest we do make a useful contribution through research into some of the assumptions on relationships between attitudes, behaviors and outcomes.

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	Denial	Anxiety/Ambivalence	Agency/Self-Efficacy
Definition	Individual denies that climate change is "real," and has no intention to change consumption behavior	Individual expresses concern that climate change/energy shortages will lead to chaos and global destruction	Individual recognizes climate change as an urgent issue, and believes by their own actions can contribute to a solution
Survey Measure (1=SD, 7=SA)	"The so-called ecological crisis facing humankind has been greatly exaggerated."	"When humans interfere with nature it often produces disastrous consequences."	"We must take stronger measures to conserve our nation's resources."
Affect/Attitude towards sustainability	*"Sustainability is important for businesses to do for the future and I agree with it... It just doesn't play a part in my life."*	*"The Earth I live on could potentially become a wasteland if humans do not change their attitude about sustainability".*	*"I think everyone has a responsibility to help keep our environment livable. The impact of sustainability has a dramatic impact on my future."*
Pre-course values N = 186	Mean = 3.01, S.D. = 1.37	Mean = 4.876, S.D. = 1.604	Mean = 5.79, S.D. = 1.272
Pre-course correlations (with 15 measures)	11 Sig. Corr. in total Sig. neg. corr. with 8 measures of pro-env. behavior; Sig. pos. corr. with 3 measures of anti-env. behavior (i.e. throwing recyclables in the trash)	3 Sig. Corr. in total Sig. pos. corr. with 2 measures of pro-env. behavior; Sig. neg. corr. with 1 measures of anti-env. behavior	7 Sig. Corr. in total Sig. pos. corr. with 6 measures of pro-env. behavior; Sig. neg. corr. with 1 measures of anti-env. behavior
Pre-course sustainability behaviour	Ignore the issue; Won't recycle; Won't support carbon tax or fee for disposable bags	Will discuss sustainability issues with friends; Not committed to either recycling or carbon tax	Does recycle; Does support carbon tax and government support for alternative energy
Post-course values N = 105	Mean = 3.13, S.D. = .599	Mean = 4.88, S.D. = 1.626	Mean =5.904, S.D. = 1.404
Post-course correlations (with 15 measures)	1 Sig. Corr. in total Sig. pos. corr. with 1 measure of anti-env. behavior	9 Sig. Corr. in total Sig. pos. corr. with 9 measures of pro-env. behavior;	9 Sig. Corr. in total Sig. pos. corr. with 9 measures of pro-env. behavior;
Post-course sustainability behaviour	Power of this attitude is greatly reduced, sig. corr. drop from 11 to 1	Increase in corr. from 3 to 9, more support for broader measures (like carbon tax) but not individual actions (still ambivalent about recycling)	Increase in corr. From 7 to 9; strongest indicator of commitment to individual actions in support of sustainability

Table 2: Attitudes from pre-course to post-course values

Attitude		(1 = SD, 7 = SA)				About how often have you .... (1 = 10% of the time, 2= 30% 3= 50%, 4 = 70%, 5= 90%)										
		I would be willing to pay a fee for using dis-posable plastic bags	I would sup-port a tax on ca-bon emis-sions	I would be willing to pay more in taxes to support renew-able energy projects	I plan to par-ticipate in events org-anized by envi-ron-mental groups	Learn what you can do to help solve en-viron-mental issues?	Talked about en-viron-men-tal issues?	Con-vinced friends to act res-ponsibly toward the environ-ment?	Re-cycled card-board?	Throw recy-clables into the trash?	Leave the air cond-itioner running when leaving home?	Use dis-posible dishes (paper plates etc.)?	Use public trans-port-ation?	Con-serve water by turning off the tap when brush-ing your teeth?	Leave the TV on in an empty room?	Switch off lights in empty rooms?
																Pre course results: N = 186
Denial	R	-0.176	-0.364	-0.276	-0.320	-0.256	-0.175	-0.284	-0.075	0.187	0.103	0.196	-0.133	-0.153	0.213	-0.114
	Sig.	0.016	0.000	0.000	0.000	0.000	0.017	0.000	0.306	0.010	0.160	0.007	0.071	0.037	0.003	0.119
Anxiety/ Ambiv-alence	R	0.143	0.141	0.144	0.125	0.145	0.101	0.157	-0.014	-0.040	-0.057	-0.160	0.117	-0.070	0.016	-0.049
	Sig.	0.052	0.056	0.050	0.091	0.050	0.173	0.033	0.850	0.589	0.438	0.029	0.114	0.345	0.832	0.505
Agency/ Self-Efficacy	R	0.099	0.344	0.448	0.359	0.250	0.069	0.231	0.065	-0.047	-0.100	-0.091	0.207	-0.029	-0.145	0.111
	Sig.	0.179	0.000	0.000	0.000	0.001	0.353	0.002	0.383	0.529	0.178	0.221	0.005	0.694	0.049	0.132
																Post Course Results: N = 105
Denial	R	-0.062	0.059	-0.081	-0.004	0.087	0.103	-0.013	-0.170	0.131	0.086	0.103	0.072	0.021	0.210	0.003
	Sig.	0.528	0.553	0.415	0.969	0.379	0.297	0.900	0.083	0.183	0.384	0.294	0.468	0.834	0.032	0.975
Anxiety/ Ambiv-alence	R	0.212	0.200	0.251	0.250	0.260	0.266	0.339	0.071	0.106	-0.164	-0.069	0.078	0.216	-0.166	0.290
	Sig.	0.031	0.041	0.011	0.011	0.008	0.007	0.000	0.473	0.286	0.096	0.486	0.434	0.028	0.094	0.003
Agency/ Self-Efficacy	R	0.343	0.434	0.407	0.244	0.136	0.200	0.264	0.226	-0.074	-0.124	-0.099	0.197	0.166	-0.006	0.284
	Sig.	0.000	0.000	0.000	0.012	0.167	0.042	0.007	0.020	0.451	0.209	0.316	0.045	0.093	0.951	0.003

Shaded cells indicate significant results

Table 3: Correlations of attitude with measures of Environmentally Responsible Behavior (ERB)