APPLYING THE RASCH RATING SCALE MODEL TO THE JUST SUSTAINABILITY ATTITUDE SCALE

by

ANDREW MCMAHAN WELLS

(Under the Direction of Diane L. Cooper)

ABSTRACT

In an era of increasing concern about global anthropogenic climate change scholars have called on researchers and administrators in higher education to take responsibility for student learning about the social and environmental implications of their daily decisions (A. Cortese, 2003, 2012; University Presidents for a Sustainable Future, 1990). Although student affairs administrators have not completely embraced the environmental literacy and activism as standards for professional competency, the two national associations for student affairs administrators have articulated social justice as a core commitment and professional standard (American College Personnel Association & National Association for Student Personnel Administrators, 2015). In this study, the author applied the Just Sustainability Paradigm (Agyeman, 2005, 2013) to research and assessment in a student affairs context. The Just Sustainability Paradigm synthesizes environmental and social justice issues by identifying the historical (Chavis & Lee, 1987) and contemporary (Agyeman, Bullard, & Evans, 2002; D. Taylor, 2000) intersections of race, class, and environmental injustice. This environmental paradigm echoes the social justice values espoused in student affairs professional standards and incorporates the lens of environmental justice.

The purpose of this study was to apply this environmental paradigm to the development of a survey instrument for quantitative research and assessment in student affairs in higher education. By developing and reporting on the psychometric properties of the 40-item Just Sustainability Attitude Scale and its four component 10-item subscales, the author demonstrated in this study that the instrument demonstrates strong reliability coefficients and content validity, supporting its use in future research and assessment activities.

Using the Rasch Rating Scale model, the researcher determined the full 40-item instrument demonstrated good separation of students ($Rel_{stu} = .92,\ \chi^2(298) = 3222.4, p < .05$), and items ($Rel_{Item} = .99,\ \chi^2(39) = 2593.6, p < .05$), indicating the separation and ordering of items by measurement value is meaningful. Based on these properties, the author recommends future investigation of student attitudes toward environmental justice using the construct developed by Agyeman (2005, 2013) and operationalized in this instrument.

INDEX WORDS: Student Affairs, Environmental Justice, Sustainability, Instrument Design, Rasch Rating Scale Model, Assessment

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DEDICATION

To the next generation.

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CHAPTER 1

INTRODUCTION

Student affairs practitioners in higher education embrace assessment and empirical research as important tools to improve practice and promote college students' learning and development (American College Personnel Association & National Association for Student Personnel Administrators, 1997/1999, 2010; Council for the Advancement of Standards in Higher Education, 2012). This study advances these professionals' understanding and development of college students' attitudes toward environmental and social justice by developing and examining the psychometric qualities of a new instrument measuring these attitudes. The study was conducted in an era of increasing sensitivity to the threats associated with global anthropogenic climate change, and the important role educators and administrators in higher education have in promoting policy and research on this issue (Intergovernmental Panel on Climate Change, 2013; United Nations Division for Sustainable Development, 2015a). The introductory chapter first explains key terms, then introduces the problem that drove this study.

Operational Definitions

To ensure clarity for the reader, key terms relevant to the study have been briefly outlined below. Because *environmental justice* and *sustainability* do not benefit from universally accepted definitions (Holifield, 2001), this section introduces the definitions for these terms the researcher employs. These terms are explored in further detail in the literature review and methods chapters.

1. *Sustainability*: a priority embraced and defined in *Our Common Future* (United Nations World Commission on Environment and Development, 1987). Sustainability – and

sustainable development – balances the needs for current generations to pursue economic development with the understanding that because natural resources are limited, some conservation of resources must be exercised to ensure the needs of future generations are not forsaken.

2. *Environmental Justice*: a social movement that situates environmental pollution and abuse in a social context; this understanding shifts with geographic, racial, and historical contexts (Holifield, 2001; Pulido, 1996; D. E. Taylor, 2000). Advocates of environmental justice trace the roots of the modern environmental justice movement to research in the late 20th century that revealed intersections between race, class, and environmental abuses (Chavis & Lee, 1987)
3. *Social Justice*: a movement *and* a goal that seeks "full and equal participation of all groups in a society that is mutually shaped to meet their needs. Social justice includes a vision of society that is equitable and all members are physically and psychologically safe and secure" ((Bell, 2007).
4. *Construct*: a theoretical item or personal characteristic of interest that cannot be directly observed, but is measured indirectly by observable items or characteristics (Crocker & Algina, 1986; Wilson, 2005)

Statement of the Problem

Leaders in higher education institutions and associations between them have long supported action on climate change and pollution (T. S. A. Wright, 2002). According to Wright (2002), the Stockholm Declaration of 1972 was one of the earliest conversations among international leaders in educational settings on the importance of environmental sustainability in ensuring both intergenerational and intergenerational equity; that is, the importance of addressing

unequal distribution of wealth and resources across the developed and developing nations at the time, as well as the concern for future generations' potential for economic development (United Nations World Commission on Environment and Development, 1987). In the early 1990's, university presidents met in Canada and France to articulate the role of colleges and universities in addressing environmental sustainability and development through teaching, research, and service (International Association of Universities, United Nations University, & Association of Universities and Colleges Canada, 1991; University Presidents for a Sustainable Future, 1990). More recently, the American Association of Colleges and Universities has articulated a framework for liberal education that promotes students' awareness of self in the context of a community comprised of diverse people, backgrounds, and challenges; these ideas arguably connect to the importance of environmental sustainability understood in a global context and pursued in the campus setting (National Task Force on Civic Learning and Democratic Engagement, 2012). While sustainability has been an articulated learning goal sought by university presidents and chancellors for decades (e.g., the Talloires Declaration), the implementation of education for sustainable development in the co-curriculum does not have as clear a history of leadership or support by student affairs staff.

Student affairs practitioners are guided by two professional associations, which share a vision for student affairs practice that embraces social justice and the pursuit of equity and access to higher education. This joint mission has recently been expressed in a renewed statement of professional competencies (American College Personnel Association & National Association for Student Personnel Administrators, 2010, 2015). While sustainability is referenced in these documents, the associations do not embrace sustainability to the same degree some members, including this author would consider appropriate. The revised statement on professional

competency (2015) frames sustainability in terms of the preservation of human and financial resources in an era of diminishing institutional and state support. This approach does not adequately capture the complexity of sustainability as it related to other social issues. Environmental sustainability is intrinsically connected with social justice for present and future generations, and student learning about sustainability must exceed the myopic expectations supported by current ACPA and NASPA professional standards. By exploring the connections between these concepts, the reader can better understand why environmental sustainability is relevant for student affairs practitioners in both their practice and their scholarship.

Promotion of environmental justice cannot be an aimless, haphazard process; like many other programs and services promoted by student affairs practitioners, students' learning about environmental justice must be supported by intentional programs and services subject to assessment and evaluation (Upcraft & Schuh, 1996). Practitioners in student affairs administration embrace assessment and evaluation as important practice for both demonstrating the merit of a program or intervention, as well as to constantly review and improve practice (Council for the Advancement of Standards in Higher Education, 2012). This practice benefits from the many resources available to practitioners, ranging from assessment guides published by the Council for the Advancement of Standards to resources provided by commissions and knowledge groups in ACPA and NASPA. Resources for administrators concerned about student's development of pro-ecological attitudes are limited; ACPA published a set of learning outcomes in the late 2000's (the document does not have a publication date, however it was developed by a committee established in 2007) that can serve as an item bank for research and assessment; the document does not constitute a validated instrument. This author has been

unable to identify any other validated published instruments designed to study attitudes toward environmental justice for use in the traditional-aged college student population.

Purpose of the Study

As explained above, instruments and item banks exist for evaluation of attitudes toward environmental sustainability (American College Personnel Association Sustainability Task Force, n.d.; Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000). Furthermore, the United Nations supports the Sustainability Literacy Test (SuLiTest), which has been developed for use throughout the world to test respondents' knowledge of issues related to environmental sustainability (Sustainability Literacy Test, 2014a). These instruments do not meet the needs of student affairs practitioners and researchers focused specifically on students' attitudes and values. As is explained in the following chapter, the Dunlap and Van Liere's 1978 *New Ecological Paradigm* scale and the 2000 revision focus on environmental sustainability, which is just one facet of the environmental justice construct examined in this study. The SuLiTest is a test of content knowledge that focuses on environmental science issues and has not been designed for use in student affairs settings in the United States. Furthermore, the SuLiTest is new instrument for which the publishers have not released validity or reliability data in any sample, let alone college students in the United States (Sustainability Literacy Test, 2014a, 2014b).

The purpose of this study was to design and evaluate the validity and reliability of a new instrument described as the *Just Sustainability Attitude Scale* (JSAS); the JSAS is an instrument created by the researcher to measure traditional-aged college students' attitudes toward four facets of Just Sustainability (Agyeman, 2013). The instrument is grounded in Agyeman's *Just Sustainability Paradigm* (Agyeman, 2005, 2013); discussed further in the literature review, this

model embraces core elements of both the sustainability and environmental justice movements, and mirrors the social justice values espoused in the ACPA and NASPA professional standards (2010, 2015).

Agyeman's Just Sustainability Paradigm (JSP) is comprised of four facets, each of which were adapted here for use as a subscale within the overall JSAS: (a) quality of life, (b) equity for present and future generations, (c) justice and equity, and (d) living within ecosystem limits. The JSP frames environmental sustainability issues as intrinsically linked with social justice issues by virtue of the historic and contemporary intersections of systemic oppression based on race, class, and gender with environmental abuse and unequal access to environmental resources (e.g., clean water and air, safe and secure food). Given this link between environmental and social issues, and ACPA and NASPA's commitment to social justice as an area of professional competency (2010, 2015), the JSP appears more directly aligned with student affairs practitioners' professional standards than the existing New Ecological Paradigm scale (Dunlap & Van Liere, 1978).

The scale examines traditional aged college students' attitudes on toward one construct: Just Sustainability. The study addressed the following questions:

1. Do the four subscales ((a) quality of life, (b) equity for present and future generations, (c) justice and equity, and (d) living within ecosystem limits) adapted from Agyeman (2005, 2013) support a valid measurement of respondents' attitudes toward Just Sustainability in the form of the full 40-item *Just Sustainability Attitude Scale*?
2. Do the subscales independently comprise statistically reliable measures of their respective facets of Just Sustainability?

Significance of the Study

This study has the implications for research and assessment in student affairs and higher education. By developing and reporting on the psychometric qualities of a quantitative instrument for Assessment, Evaluation, and Research (American College Personnel Association & National Association for Student Personnel Administrators, 2015) activities which is focused on the intersections of environmental and social justice, the author has provided a tool for the advancement of the environmental justice discourse in higher education and student affairs. The instrument in this study proved to be a reliable measure of students' self-reported opinions regarding justice, and may be used to incorporate an environmental justice lens in student affairs practitioners' development of learning outcomes and assessment plans.

Conclusion

The consensus in the scientific community that global climate change is largely anthropogenic places the responsibility for addressing the impending crisis squarely on this generation and the next (Intergovernmental Panel on Climate Change, 2013). Today's college students and administrators must be committed to the exploration and promotion of awareness and pursuit of environmental justice (A. D. Cortese, 2003, 2012), if we are going to seriously address climate change.

CHAPTER 2

LITERATURE REVIEW

The purpose of this study was to use the Rasch Rating Scale model to assess the psychometric qualities of researcher-designed instrument measuring college students' attitudes toward environmental justice. To understand environmental attitudes and activism, it is important to consider pathways to these attitudes and the paradigms that support the development of pro-environmental perspectives. This chapter examines the social and ecological issues that inform the study of environmental justice and establish the importance of research in this area, whereas the subsequent chapter addresses literature informing psychometric instrument development and validation.

The chapter begins with a discussion of the idea of global citizenship, which is considered an important element of liberal education. This discussion is followed by an exploration of the evolution of environmental justice, social justice, environmental sustainability, and how these concepts are connected to the Just Sustainability Paradigm (JSP) that informs the instrument developed in this study (Agyeman, 2013).

Global Citizenship

Global citizenship is a priority for a liberal education as established in *A Crucible Moment* (National Task Force on Civic Learning and Democratic Engagement, 2012); this priority situates institutions in the United States as part of an increasingly globalized planet. The task force articulated the importance of a "contemporary, comprehensive framework for civic learning [that embraces] US and global interdependence" (pg. vi). The report also connects education for democratic engagement and citizenship with values that advance justice and

equity. This approach to citizenship and global perspective-taking incorporates personal and social responsibility (Chickering & Braskamp, 2009) in the context of a pluralistic society. Personal responsibility extends to the student's role in this society, which – as discussed below – is destabilized and threatened by social and environmental injustices.

Social Justice

Social Justice is often described as both a movement and a goal; both approaches to conceptualizing social justice align with student affairs practitioners' values and professional commitments. In the context of student affairs administration, social justice informs practitioners' pursuit of equitable access for diverse college students in contrast with the long history of access to education being limited to an elite.

The Social Justice and Inclusion area of professional competency for student affairs administrators addresses both administrators' responsibility for promoting equity and inclusiveness for staff, students, and faculty on campus, *and* the inherent value in continued development of self-awareness around the individual's relationship with power and privilege (American College Personnel Association & National Association for Student Personnel Administrators, 2015)

Social justice advocates argue that oppression, power, and privilege arise from socially constructed, artificial structures that are "interconnected and cross-cutting" and dehumanizing (Hardiman, Jackson, & Griffin, 2007), and that no single issue of oppression can be isolated and addressed independently of others. This approach to social justice aligns with the environmental justice movement described in the next section; environmental justice articulates a connection between social identities (i.e., race, socioeconomic status) and structural environmental abuses in

an approach that many consider to be separate from the environmental sustainability movement (Holifield, 2001).

Environmental Justice and Sustainability

Contemporary advocates for environmental justice and sustainability pursue their work without the benefit of a common framework or definition for their objectives. The following three sections articulate the relationships between sustainability, environmental justice, and the Just Sustainability Paradigm (Agyeman, 2013) employed in this study. The three frameworks for sustainability can be visualized on a continuum, with *sustainability* and *environmental justice* at the ends of the continuum, and *just sustainability* near the middle (see Figure 1). Below, environmental justice and sustainability are discussed before the exploration of just sustainability, because the latter is conceptually related to the two former frameworks, and because it is the most recently developed paradigm.

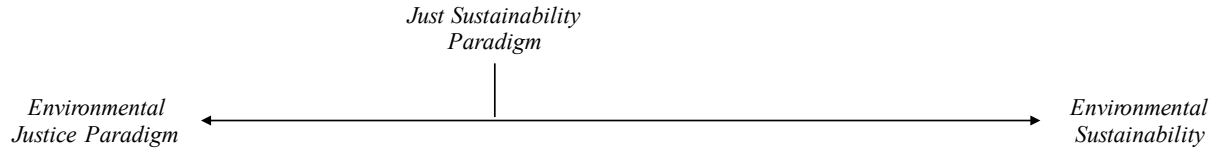


Figure 1
Continuum of justice and sustainability paradigms

Sustainability

The modern sustainability movement is largely an international development framework laid out in the report *Our Common Future*, and which seeks to balance the current generation's need to pursue economic development with future generations' potential for development (United Nations World Commission on Environment and Development, 1987). This approach to acknowledges the scarcity of natural resources and the need to focus on the development of renewable resources (e.g., solar and wind power rather than fossil fuels) and is promoted by the

United Nations. The sustainability paradigm is often summarized as balancing *people*, *planet*, and *profit* in order to engage non-governmental organizations as well as governments (Elkington, 1999) in economic and social development programs that consider the environmental impact – and implications for underserved populations. Sustainability, sustainable development, and education for sustainability are agendas established and pursued on the global scale with the leadership of the United Nations (United Nations Division for Sustainable Development, 2015b).

Today's generation may be surprised to learn that modern environmental movement has roots that predate *Our Common Future.* While the lens of politics, economics, and international development was incorporated in the environmental discourse in the 1980s, the importance of environmental issues predates this framework. *Silent Spring* (Carson, 1962) is an early example of a popular exploration of environmental issues and the impacts of human behavior on other species. Research on the impact of human behavior on the natural environment predated study of the sociological conditions that foster ecologically unsustainable behavior (Catton & Dunlap, 1978; Dunlap & Catton, 1979).

Since these early decades, researchers have continued to refine their understanding of the impact of human behavior on the natural resources and environments upon which we rely. According to the *Millennium Assessment* report, researchers found have found that roughly 60% of ecosystems across the world have been degraded by human behavior; in addition to the intrinsic threat of this degradation to natural resources, the authors argued that this ecosystem abuse also threatens the United Nations Millennium Development goals (United Nations Millennium Ecosystem Assessment Board, 2005).

Measurement and the New Ecological Paradigm. The early environmental policy movement benefited early on from a focus on strictly environmental issues studied by biologists

and chemists; that focus eventually evolved to include the sociological and psychological dimensions of environmental issues. As early as the 1970s, researchers began to study public perceptions toward natural resources and public policy through the use of survey (Dunlap & Van Liere, 1978). Dunlap and Van Liere's development of the *New Ecological Paradigm* (NEP) instrument (1978) and its revised version led the way to decades of research on populations' and individuals' attitudes toward environmental sustainability (Dunlap et al., 2000). The NEP scale has been the most widely used instrument in social science, psychology, and by policymakers to understand the public's attitudes toward environmental issues (Amburgey & Thoman, 2012; Pienaar, Lew, & Wallmo, 2013), and has been embraced as a valuable instrument when the entire 15-item version is used with the five subscales preserved (Amburgey & Thoman, 2012; Hawcroft & Milfont, 2010).

Critiquing sustainability. Critics of the environmental sustainability movement have argued that it privileges political and social elites, and that the focus on economic development overlooks the environmental impacts of corporate entities on underprivileged communities (Agyeman, 2013; Agyeman et al., 2002; Bullard, 1990; D. E. Taylor, 2000). The critique of sustainability views elites as removed from the experiences of underprivileged people in developing countries, and argues that the top-down approach to sustainable development prioritizes economic development programs that benefit the wealthy, without adequately addressing pressing environmental issues. The environmental justice critique of sustainability often hinges on the admission that environmental justice and social justice critique the political and economic structures that the sustainability movement relies upon to advance the sustainability agenda (Dobson, 2003). Unsurprisingly, some advocates for aggressive reform of economic and social institutions argue "the process of global economic restructuring [facilitated

by neo-Liberalism in the 1990s]…is responsible for the deterioration of the ecological and working/living conditions of the poor and people of color" (Faber & McCarthy, 2003). The focus on the implications of race and class for environmental issues is often described as a focus on environmental justice.

Environmental Justice

The environmental justice movement in the United States emerged as early as the 1980's in response to the observations that corporate and political entities were disposing of waste, citing industrial operations, and generally locating environmentally abusive operations in communities of color and low-income areas (Chavis & Lee, 1987; Goldman & Fitton, 1994; Roque, 1993). The early movement focused on toxic waste and industrial pollutants' impact on low income communities and communities of color (Pulido, 1996). While agencies of the federal government were able to provide evidence of specific examples of the correlation between race, class, and environmental abuses, the knowledge of the problem did not always result in policy change (General Accounting Office, 1983).

Environmental justice has been characterized as a grassroots movement addressing environmental and social injustices concurrently because they are intrinsically linked by their common cause: economic and social structures of power that subordinate environmental and human rights to corporate and political profit (Agyeman et al., 2002). A distinguishing characteristic of environmental justice, in contrast with strict sustainability, is its focus on the living and working conditions of economically disadvantaged populations, communities of color, and, in a global context, people in developing regions. Advocates for justice in the environmental movement argue we must acknowledge the connections between development

and environment, and that environmental degradation constitutes a threat to development as well as to underserved populations (Swilling & Annecke, 2012).

In her examination of pathways to environmental activism, Taylor (2000) argued that the fragility of the natural environment and the drive to preserve or conserve wildlife is only one of several potential pathways to environmental activism. Taylor articulated four pathways to sustainability and environmental justice that embrace the importance of class, race, and gender in understanding environmental movements. She described (a) a focus on the preservation of the natural environment, (b) the labor movement's pursuit of safe and healthy working conditions, (c) an upper-middle class's embrace of the aesthetic value of parks and open spaces in urban environments, and (d) a social justice approach by people of color that linked self-determination, human rights, and the environmental abuses of spaces of color by corporate and political structures (Taylor, 2000). This fourth pathway, which is primarily associated with communities of color, is illustrative of the Environmental Justice Movement (EJM) in the United States. In these approaches, Taylor acknowledged the influence of the environmental sustainability movement as a basis upon which the EJM was developed (2000).

Faber and McCarthy (2000) mapped the evolution of EJM to six distinct political movements: (a) the civil rights movement, (b) elements of the farm labor rights movement, (c) the rights of Native Americans, (d) public health as affected by toxins in food and land, (e) the global human rights movement, and (f) the grassroots social justice global progressive movement. Faber and McCarthy's pathways to environmental justice vary slightly from Taylor's (2000), and demonstrate the diversity of perspectives and movements that lend themselves to addressing ecological issues in social and political contexts.

Just Sustainability

The focus of this study is the development of a scale to measure attitudes toward *just sustainability*; this is a very specific approach to environmental and social justice issues developed by Julian Agyeman (2005, 2013) as an attempt to balance the competing priorities of the two environmental paradigms discussed above (see Figure 1). Agyeman's advocacy for sustainable communities synthesizes the understood, achievable elements of sustainable development with the elements of race and class equity that are still a source of conflict across the country, and indeed the globe. The Just Sustainability Paradigm (JSP) resolves the differences between environmental justice and sustainability by situating grounding the environmental sustainability discourse in issues of racial and class inequity.

Agyeman's JSP envisions an approach to environmental and social injustices that is holistic. In this model, he advocates policy-making that addresses the intergenerational nature of the WCED framework for sustainable development while addressing the *intragenerational* issues inherent in contemporary environmental justice challenges (2005, 2013). This model addresses the environmental justice movement's critique of the privilege inherent in the sustainability movement, and supports the infusion of community-oriented environmental justice priorities in corporate and political structures.

As discussed above, policymakers' and activists *awareness* of the race and class implications for environmental issues has developed far faster than policy and structures have moved to address these inequities (Agyeman, 2005; Goldman & Fitton, 1994). In the JSP, policy, research, and activism are envisioned in a global context where foreign and domestic policy both have implications for sustainable development and justice (2005). This holistic approach to just sustainability is comprised of four focal areas (Agyeman, 2005, p. 92):

1. quality of life

2. present and future generations

3. justice and equity, and

4. living within ecosystem limits

Quality of life. The JSP addresses quality of life in terms of community members' access to common standards of living, such as a living wage, access to food, water, and shelter, and other such daily necessities. Gross domestic product (GDP) is often used as an indicator of citizens' access to these kinds of resources, however the JSP critiques this approach, arguing that it fails to account for community and family commitments (e.g., elderly care, childcare), volunteerism, or other activities driven specifically by concerns for environmental justice (Agyeman, 2005, 2013). Thus, the quality of life element of JSP indicates a need to consider the difference between wealth and actual satisfaction; readers may be reminded of the adage that money does not buy happiness.

Present and future generations. An important characteristic that separates the JSP from the environmental sustainability paradigm is the embrace of *intragenerational* equality. As described above, a critique of the sustainability movement is the focus on preservation of access to resources for development in future generations; essentially, today's generation must leave something for our children and grandchildren. This perspective, while important, fails to address the needs of our neighbors, and which some argue is indicative of the innate incongruence of sustainable development (Malazczuk, 1995). Agyeman argued that this failure to address current inequity in the sustainability paradigm contributed in part to the development of the Environmental Justice movement, and thus is retained here in the JSP (2005).

Justice and equity. The defining characteristic of the *just sustainability paradigm* is its focus on justice. The JSP situates justice and sustainability in local contexts, and requires

acknowledgement of the influence of space and community on issues of justice (Roberts, 2003). Environmental sustainability and equity cannot be achieved without considering justice. Agyeman accepted others' critiques the environmental justice movement's anthropocentric nature; because its focus is on the environmental implications of race and class inequality, the "nonhuman world" is excluded from the environmental discourse (Agyeman, 2005, p. 94-95).

Living within ecosystem limits. The JSP would not be a framework for environmental justice if it did not embrace resource conservation and environmental sustainability. This paradigm departs from others in that it acknowledges the differential consumption rates of the global *north* (i.e., developed) and developing nations (Agyeman, 2005), and the different consumption practices (Nyong, 2009). As the global community embraces the science of – and pursues the solution to – global anthropogenic climate change (Intergovernmental Panel on Climate Change, 2013), the disparities of wealth and resources, consumption, and development are significant challenges to address (Brainard, Jones, & Purvis, 2009). Considering these priorities at the local level is an important element of the JSP.

Moving Toward Practice

These environmental paradigms are not explored here in a vacuum. They are considered in the context of student affairs practice in higher education, where we are concerned with students' learning and development. To better research how students' development toward just sustainability can be promoted, we must research it and assess the programs we design to influence JSP. Because the issues underpinning environmental justice are not universally defined (Holifield, 2001; Van Weelie & Wals, 2002; Wals & Corcoran, 2004), educators must focus on the elements of these constructs' intersections that are conceptually accessible and relevant for their students. Just sustainability requires systemic thinking; an approach to

environmental, social, and economic justice issues as they interact and intersect (Agyeman & Crouch, 2004; Rowe & Johnston, 2013; Sterling, 2004) and influence one another. Student affairs practitioners can promote environmental justice by developing programs and co-curricular experiences that empower students to apply academic and experiential learning to synthesize these elements of justice and develop systemic thinking.

Consistent with the framework of the Just Sustainability Paradigm, this study applies the systemic approach of conceptualizing environmentalism and social justice as intertwined. For the purpose of research and assessment in higher education and student affairs, practitioners may find the justice-oriented focus conceptually related to other social justice-oriented programs and initiatives with which they are already familiar; this model embraces a social justice ethic that has long been a priority for student affairs administrators, and benefits from the application of a social justice lens to environmental issues that have not been adequately embraced (American College Personnel Association & National Association for Student Personnel Administrators, 2015). The JSP's unique synthesis of environmental and social justice issues aligns more closely with NASPA and ACPA's standards for professional practice than the environmental sustainability movement (American College Personnel Association & National Association for Student Personnel Administrators, 2010, 2015).

Environmental Justice, Sustainability, and Student Affairs

Sustainable development is an issue of global importance; the United Nations has called for education for sustainable development: "Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues (United Nations Council on Economic Development, 1992) In the United States, researchers, instructors, and administrators have long acknowledged their responsibility for

advancing sustainability. From international agreements to homegrown movements in the United States, the role of higher education in addressing environmental injustices has been clearly articulated (A. D. Cortese, 2003; International Association of Universities et al., 1991; University Presidents for a Sustainable Future, 1990). The environmental sustainability movement described in the previous section is particularly prominent by virtue of its roots in environmental sciences and environmental research conducted at these institutions. Indeed, the role of institutions of higher education in advancing scholarship around sustainable development in particular has been advanced with the support of the United Nations (International Conference on Higher Education for Sustainable Development, 2015; United Nations Division for Sustainable Development, 2015a; T. S. A. Wright, 2002). This connection between higher education, sustainability, and sustainable economic development in particular has been described as a moral and ethical imperative, in addition to the obvious connections between research and policymaking (A. D. Cortese, 2003; Georgia Initiative for Climate and Society, n.d.). The transformative learning sought in higher education benefits and promotes education for sustainability (Svanstrom, Lozano-Garcìa, & Rowe, 2008). Below, literature informing student affairs administrators' role in education for sustainability and environmental justice is examined.

Student Affairs Administrators' Roles

While the literature and policy declarations clearly illustrate the importance of research and teaching at colleges and universities for the advancement of environmental sustainability – and, as argued here, justice – we must consider the specific responsibilities and opportunities inherent in student affairs administrators' work. Student affairs administrators' responsibilities vary based on institutional type and mission, organizational, and even cultural and historical contexts (Creamer, Winston, & Miller, 2001).

Student services, learning, and development. Over the past century, student affairs administrators' responsibilities have changed as the role of the academy has evolved. Initially, the development of student *services* was meant to meet students' needs for career or vocational guidance, housing and dining, financial assistance, and extra-curricular activities (American Council on Education, 1937). Over the course of the 20th century, the role of administrators in higher education evolved in response to the democratization of higher education, the competition with Europe and Asia for jobs and geopolitical power, and changing values around moral issues. Student affairs administrators began to focus more on promoting and enhancing student learning (American Association for Higher Education, American College Personnel Association, & National Association for Student Personnel Administrators, 1998; American College Personnel Association, 1994). As student affairs personnel came to better understand their roles in promoting equity and justice in higher education, as well as the holistic development of the students with whom they worked, a new perspective on practice in student affairs emerged. The focus on college student development frames students' experiences holistically, and acknowledges that student learning and growth occurs within and between the classroom and the world outside (American College Personnel Association & National Association for Student Personnel Administrators, 2004). In 2015, ACPA and NASPA published a renewed statement on professional competency areas that introduced technological competency as an area of practice. While this most recent document revised and enhanced the language around social justice and introduced an entirely new competency category, it also diminished – perhaps inadvertently – the role of education for environmental justice in student affairs administration. Rather than embracing the current discourse of global climate change and the shared responsibility for addressing environmental issues, the 2015 document frames sustainability as a

discussion of efficient administrative practices in an era of financial constraints (American College Personnel Association & National Association for Student Personnel Administrators, 2015). This document failed to seize the opportunity to acknowledge the implications of environmental justice for social justice and student affairs practice. The problematic nature of this failure to enact environmental justice in student affairs practice is compounded because it leads to the missed opportunity to collaborate with faculty and researchers in campus-wide engagement of environmental justice across the curriculum (Wells, 2014).

Moral and ethical development. Amongst the elements of college student development with which student affairs administrators are concerned, students' moral and ethical development is an important topic. Administrators and researchers who study college student affairs draw upon a body of literature that articulates a developmental path in which students develop progressively more complicated lenses through which to understand moral issues; this path begins with a basic focus on self, and advances to understand the individual in the context of a community and relationships with others (Gilligan, 1977; Kohlberg, 1984). This pathway of moral development is studied and facilitated by student affairs personnel who understand students' moral behavior and the moral implications for sustainability, and environmental justice are interrelated and are developing during college (Dunn & Hart-Steffes, 2012; Kerr & Hart-Steffes, 2012). Environmental justice is a moral issue, rather than simply a question of the green-ness of a facility or program, and educating students about the connection between local and global moral decisions is firmly aligned with student affairs practice (Edwards, 2012). Indeed, the porous boundary between curriculum and co-curriculum enables student affairs practitioners to promote just sustainability by synthesizing curriculum, moral issues, and environmental issues (Buckley, 2015).

Student leadership, activities, and involvement. Because student affairs administrators primarily engage students' learning and development in the co-curriculum, it is important to understand the intersection of just sustainability with co-curricular learning. This learning happens in residence halls, student government, student recreation, clubs and organizations, fraternity and sorority life, and in the spaces between. Researchers explore the nature of student involvement in these activities to better understand the connections between students' identities, reasons for pursuing leadership and involvement, and the type of activities students choose to pursue (Dugan, 2013; Multi-Institutional Study of Leadership, 2015). Research by sustainability advocates has demonstrated that educational programs like green living-learning residential communities (Watson, Johnson, Hegtvedt, & Parris, 2015) and service-learning while studying abroad (Tarrant & Lyons, 2012; Tarrant, Rubin, & Stoner, 2013) has meaningful impacts on students' knowledge and values toward environmental issues. These interventions are particularly important because while many students report they are aware of the importance of environmental issues in the global and abstract sense (Eagan et al., 2014), this knowledge does not always translate to application in their daily lives (Savageau, 2013). This research is grounded in the environmental sustainability paradigm, and fails to address many of the social justice implications of sustainability in research and policy; despite these limitations, the implications for practice and further research are clear.

Conclusion

A review of the literature is informing the development of the two discrete paradigms that inform actors in the environmental movement, and described the relationship of the Just Sustainability Paradigm (Agyeman, 2005, 2013; Agyeman et al., 2002) to the two contrasting movements. Finally, the relationship between student affairs administrators' professional

competency and social justice values has been explained to demonstrate the importance of this research for scholars and practitioners in student affairs. The following chapter will briefly review the theoretical literature that informs the design of this study.

CHAPTER 3

LITERATURE INFORMING INSTRUMENT DESIGN

In this chapter, the author reviews literature addressing the design, development, and evaluation of the validity of survey instruments in educational testing and research. Chapter 4 addresses methodological decisions specific to this study, whereas this chapter introduces the literature that grounds those methodological decisions by reviewing the theories and traditions guiding survey development. The discussion below addresses *tests* and *true scores*. While the focus of this author's research is the nature of college students' *attitudes*, this chapter describes the models in terms of their exploration of *true scores*. Thus, students' attitudes toward just sustainability are being treated as their "true scores" on a test of their endorsement of Agyeman's *just sustainability*, and the "test" in this context is the survey instrument developed by the author (2005, 2013).

Psychometric Traditions

From Spearman's *G* coefficient for intelligence to today's debate over the advantages of scaled scores versus item responses, the past century has seen considerable evolution in the approach to research in the social sciences (Crocker & Algina, 1986; Thorndike, 2005). Thoughtful researchers are mindful that measurement is conducted for the purpose of research and assessment, and not merely to satisfy intellectual curiosity (Hattie, Jaeger, & Bond, 1999); this same thoughtfulness brings researchers to a discussion of the merits of discrete models and theories for measurement. The sections below review two traditions into which measurement models are organized: test-score models that focus on overall scale scores, and scaling models

that examine discrete items' functions within the instrument under development (Engelhard, 2013; Hambleton & Jones, 1993; Hattie et al., 1999).

Test-Score Tradition

The test-score tradition was the first to develop in the field of psychometrics (Crocker & Algina, 1986). Measurement models in this tradition include classical test theory (CTT), factor analysis (FA), and structural equation models (SEM). This tradition comprises the early approach to instrument design and use, and persists today. The test-score approach focuses on respondents' overall test scores and the source of error in the measurement of scores. The chief concern in this tradition is the nature and source of measurement error, and how to account for this in the pursuit of identifying true scores. Here, an individual's observed measured score x is understood to be a function of the addition of the true score θ and the error score ϵ; thus, CTT can be summarized with the equation $x = \theta + \epsilon$ (Jones & Thissen, 2007). In these models, researchers report reliability coefficients such as Cronbach's α; this coefficient indicates the correlation between a respondent's scores over repeated measurements using a parallel test or measurement (Cortina, 1993; Crocker & Algina, 1986). The New Ecological Paradigm scale and its 2000 revision described in Chapter 2 were designed using CTT (Dunlap & Van Liere, 1978; Dunlap et al., 2000). In this tradition, responses to questionnaire items are sorted into categories (e.g., Likert-type responses such as "agree" and "disagree"). These responses may be analyzed using analyses such as *chi-square* tests, or the categorical responses may be given numerical values and then summed and inappropriately treated as ordinal or interval data (Stevens, 1946).

A limitation of Classical Test Theory is that a test-taker's aptitude can be evaluated only in the context of the score, without the knowledge of the relative difficulty of the item(s) on the score. Hattie, Jaeger and Bond (1999) cite Hambelton, Swaminathan, and Rogers (1991):

"Perhaps the most important shortcoming…is that examinee characteristics and test characteristics cannot be separated…When the test is 'hard' the examinee will appear to have low ability'" and *vice versa* (pg. 399). Critics of the test-score tradition argue that in focusing on overall scores and overlooking specific item responses, researchers overlook potentially valuable details (Engelhard, 2013; Wilson, 2005). For example in linear regression, factor analytic, and structural equation models, test scores are traditionally standardized and examined using correlation coefficients (Loehlin, 2011; Reise, Widaman, & Pugh, 1993).

A limitation related to CTT that is the categorical nature of the data collected in this study (see Chapter 4). The polytomous response options (e.g., Strongly Disagree to Strongly Agree) represent a presumably continuous latent variable: the respondent's attitudes toward each respective item on the questionnaire. These categorical data cannot be assumed to have a normal distribution (Wirth & Edwards, 2007). Indeed, by treating the continuous (latent) variable as a categorical variable for analysis in the classical test tradition, the complexity of the data is diminished, and inappropriate statistical analyses may be applied (e.g., linear regression models applied to categorical data).

Scaling Tradition

The scaling tradition emerged in the 1950s and 1960s, and is concerned with the interaction of person and test, and the duality of this reaction as it emerges in the responses to discrete items on an instrument (B. Wright, 1997). In the scaling tradition, theories that examine person-item interaction and apply two- or three-parameter logistic models are intended to measure a single construct while accounting for item difficulty and guessing (Hambleton & Jones, 1993; B. Wright, 1997). This approach to these additional parameters strengthens the model relative to a CTT model. The author used the Rasch Rating Scale model to analyze data

collected in this study and to understand the psychometric qualities of the Just Sustainability Attitude Scale.

Rasch Rating Scale Model

Rating scales in general are utilized to measure the intensity or strength of the latent trait (Linacre, 2002) or attribute (e.g., pro-environmentalism). The Rasch rating scale model is a specific form of item response model that uses the formula below to determine the probability of a response given item difficulty and person ability, given a fixed number of response categories (Engelhard, 2013), as in Likert-type response options used in this study. The utility of this model lies in part in its conversion of categorical ordinal data (e.g., responses to Likert-type items) to interval data (e.g., the difficulty of an item, expressed in logits) that support more advanced analyses (Stevens, 1946). This model enables assessors to distinguish the differences in test-taker ability and item difficulty, and to arrange test-takers and items in order of difficulty and relative ability based on the measurements collected via the test. The interval data also empower test developers to construct shorter tests by eliminating psychometrically redundant items.

This model is represented by the equation below, where P_{ik} is the probability of responding k on item i, P_{nik-1} is the conditional probability of soring k-1 on item i, θ_n is the test-taker's ability on the latent trait (e.g., endorsement of just sustainability) and τ_k is the threshold location between the two adjacent response options (e.g., threshold between "disagree" and "agree" in the JSAS response options) where the probability of response to either response option is equivalent (Engelhard, 2013).

$$\phi_{nik} = \frac{P_{nik}}{P_{nik-1} + P_{nik}} = \frac{\exp\left(\theta_n - (\delta_i + \tau_k)\right)}{1 + \exp\left(\theta_n - (\delta_i + \tau_k)\right)}$$

This model applies a non-linear transformation to represent item difficulty and person ability in log-odd units ("logits"), which are applied in invariant measurement. By transforming individual items' and persons' proportions of (correct) responses using the Rasch model, predications can be made regarding the probability of a "correct" response on an item given the item's difficulty.

Rasch models such as the Rating Scale model employed in this study are used to transform categorical data into interval data for invariant measurement; thus, an instrument calibrated using these methods can be treated as an invariant measure of the latent trait, provided the modelled and empirical data demonstrate good fit. Using the logit scale developed in these models, researchers may draw conclusions about the strength of students' ability on the latent trait, and apply inferential statistics to these interval data in a research setting.

As demonstrated in Chapter 5, Rasch Rating Scale model data provide greater information about the quality and characteristics of test items and students than a typical CTT factor analytic approach. Whereas factor analysis demonstrates the presence of a latent trait(s) via the correlation of items and scales, the Rasch model represents the performance on each item by each person. The Rating Scale model, which is applied to data collected using a uniform category structure across all test items (Engelhard, 2013), is employed to develop item- and person-fit statistics and performance characteristics. Using item characteristics (e.g., Infit and Outfit statistics, point-biserial correlation, item difficulty) the researcher may explore differences between modeled and empirical data to identify items and persons whose performance does not match their predicted scores. Using these fit statistics and item difficulty measures on the logit scale, items' whose excessive difficulty (or ease) or unclear wording may be identified as candidates for revision. In this study, item misfit values were used to drive the revision process

in the pilot phase of the study (see Chapter 4), as well as to draw conclusions for future research (see Chapter 6).

Construct and Questionnaire Items

The latent variable of interest here is attitudinal in nature, rather than a measureable trait or ability; thus, the discussion of "tests" and "ability" here uses the language of measurement theorists to describe the approach to measuring college students' *attitudes* ("ability") toward just sustainability (Agyeman, 2005, 2013) using the Rasch Rating Scale model to calibrate the items on Just Sustainability Attitude Scale (the "test").

Constructs

One cannot measure *attitudes* using a physical instrument like a ruler or scale; therefore, the principles of measurement described above are applied here to develop a questionnaire that examines the latent variables of interest by inquiring directly about items *related to* the construct, and testing the relationships between those items to determine if the correlation between the items supports a claim that the items represent the construct. The purpose of the items is to enable the researcher to make inferences about the latent, unobservable variable based upon the observed responses to the researcher's instrument (Wilson, 2005).

Item and Person Separation

Items on a test or measure are examined to determine how they are correlated with one another, which can demonstrate their validity. The reliability of discrete items within a scale is calculated using Cronbach's α, reported as a coefficient value between 0 and 1. In the Rach rating scale model, Rasch software such as Facets is employed to generate reliability coefficients describing the reliability of item and person separation. Reliability of person separation can be treated as the reliability coefficient familiar to researchers (Cronbach's α); reliability of item

separation is a separate test statistic that reflects the distinctiveness of items on the test, and their separation on the variable map.

Test Evaluation

To ascertain the relative merit of a given measurement instrument, it is important to consider several characteristics of the instrument and the respondents to whom it is administered. Researchers need to know whether the test measures the constructs it is intended to examine, and how reliable that measurement is (Creswell, 2014). The following sections address the theoretical and practical aspects of these test characteristics.

Reliability

Test reliability is the characteristic that describes the stability of the test over repeated administrations (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014). Crocker and Algina (1986) described reliability as "the degree to which individuals' deviation scores…remain relatively consistent over repeated administration of the same test or alternate test forms" (pg. 105). Instrument designers and researchers include reliability coefficients when reporting on measurement outcomes using reliability coefficients such as Cronbach's coefficient alpha (α) which has the added benefit of being a statistic that can be calculated using the data gathered in a single test administration (Cortina, 1993; Crocker & Algina, 1986). Less frequently used methods for calculating test reliability include the Kuder Richardson 20, and Hoyt's analysis-of-variance (Crocker & Algina, 1986); researchers in student affairs in higher education are familiar with the α coefficient as a commonly reported test statistic, thus it is the reliability coefficient applied in this study. Because instrument reliability has implications for generalizability, it is

often discussed in conjunction with validity (American Educational Research Association et al., 2014).

Validity

Validity is a separate but related characteristic in the evaluation of a measurement instrument, and represents the confidence with which a researcher claims the instrument represents the construct it is designed to measure. Messick wrote that "validity is not a property of the test…but rather the meaning of the test scores" (Messick, 1995) . Validity has traditionally been understood to comprise three facets: construct, content, and criterion-related (Andrich, 2004; Crocker & Algina, 1986; Messick, 1995).

Content validity. This form of validity is sometimes described as "face validity", and is meant to describe the degree to which instrument developers have designed items that sample the construct or domain of interest. Researchers may address content validity by consulting external experts to evaluate the relevance of the items for the constructs they are purported to examine (Crocker & Algina, 1986; Messick, 1995).

Criterion-related validity. Criterion-related validity can best be understood in the context of high-stakes testing, such as standardized tests used in graduate study admissions decisions (Crocker & Algina, 1986). In such circumstances, test administrators and evaluators need to understand the degree to which the test has predictive or concurrent validity. These descriptors indicate the extent to which test scores predict future performance (in the case of the former) or reflect the examinee's level of proficiency at the time of the test administration (in the case of the latter).

Construct validity. In educational and psychological testing, the characteristics of interest are often unobservable or *latent* variables. Thus, researchers are concerned with

construct validity, which describes the degree to which a researcher may claim an instrument examines the latent variables under investigation (Messick, 1995).

Conclusion

This chapter has briefly reviewed two broad traditions in psychometrics: the test-score tradition and the scaling tradition. This discussion was followed by an examination of classical test theory's concerns with reliability and validity. The following chapter will describe the design of this study and the methodological decisions made given the conceptual background established in this chapter.

CHAPTER 4

METHODS

The purpose of this quantitative study was to develop and test the validity of an instrument that measures traditional-aged (18-24) college students' attitudes toward *just sustainability* (Agyeman, 2005). This chapter explains the proposed design of the study, beginning with a discussion of the construct and item development, followed by a discussion of data collection and analysis.

Methods for Item Development

In psychometric research, the term "construct" describes a variable of interest (Crocker & Algina, 1986; Messick, 1995; Wilson, 2005). The purpose of instrument development is to design an instrument that can measure or assess constructs that are unobservable in nature. Thus, researchers are interested in unobservable or *latent* constructs. These may represent unobservable but concrete concepts such as knowledge on an academic subject, or more abstract variables such as attitudes or beliefs. In this study, the construct of interest was college students' attitudes toward environmental justice, as framed in Agyeman's Just Sustainability Paradigm (2005, 2013).

This study was informed by a paradigm that articulates a single principle (just sustainability) that is comprised of four elements: (a) quality of life, (b) equity for present and future generations, (c) justice and equity, and (d) living within ecosystem limits. The four elements of the JSP are related because they are part of the overall framework, and because they are conceptually related: one would expect a respondent who embraces justice and equity to also

apply that ethic of justice across generations, as well as within their own generation. The following sections describe steps the author took in developing the 40 items that comprise the scale under developed in this study (see Appendix A). Some items were adapted from existing instruments, whereas others were written uniquely for this study and are grounded in the literature reviewed in Chapter 2.

Just Sustainability Paradigm

This instrument is grounded in the Just Sustainability Paradigm (JSP) developed by Tufts University Professor Julian Agyeman and his various collaborators over the past decade (Agyeman, 2005, 2013; Agyeman et al., 2002; Faber & McCarthy, 2003; Morales, 2011). The author chose this environmental paradigm because of its relatively recent development and more importantly, its philosophical alignment with student affairs practice (American College Personnel Association & National Association for Student Personnel Administrators, 2015). The JSP is divided into four elements; three of these elements (Justice & Equity, Present & Future Generations, and Quality of Life) comprise the aspects of the JSP that incorporate social justice priorities in the now-familiar sustainable development movement (Agyeman, 2005). The fourth facet of the JSP addresses the reality of the Earth's finite resources and the need for humans to pursue a sustainable path to development; this facet may be familiar to readers who come to the JSP with a New Ecological Paradigm (i.e., traditional sustainability) background (Catton & Dunlap, 1978; Dunlap & Catton, 1979; Dunlap & Van Liere, 1978).

In writing items grounded in the JSP, this author reviewed Agyeman's published works with attention to the 2005 book *Sustainable Communities and the Challenge of Environmental Justice*. The items developed here were also informed by critiques of the environmental movement (Deutz, 2014; Schlosberg, 2007; Swilling & Annecke, 2012; Wolfe, 2010), students'

learning about global issues in local contexts (Tarrant et al., 2013), and the author's ongoing exploration of contemporary environmental discourse in his own academic and social circles. The focus in writing items for the three social justice-focused subscales was to write items that were accessible to traditional-aged college students (18-24) but would be applicable in multiple contexts. Thus, items focusing on issues specific to urban or rural settings or unique to geographic regions were dismissed in favor of items that addressed broader aptitudes or values.

Published Instruments and Items

As explored in the literature review, numerous published instruments addressing attitudes toward environmental issues have contributed to the evolution of the environmental movement and the psychometric instruments used in research about this movement. Some, such as the original and revised New Ecological Paradigm scales have been widely used in the original form (with validity and reliability coefficients reported) and have been adapted for use in other settings (Catton & Dunlap, 1978; Dunlap & Catton, 1979; Dunlap & Van Liere, 1978; Dunlap et al., 2000; Harraway, Broughton-Ansin, Deaker, Jowett, & Shephard, 2012). Others, such as the item bank published by the American College Personnel Association (ACPA) include a wide array of items with limited conceptual organization and no validity or reliability data (American College Personnel Association Sustainability Task Force, n.d.). In other cases, such as the Sustainability Literacy Test (SuLiTest), the ongoing process of developing an international instrument for testing college students' content knowledge has resulted in a wealth of items with limited reliability data, and which this author asserts would exhibit differential item functioning (Hattie et al., 1999) based on test-takers' demographics (Sustainability Literacy Test, 2014b). Because the purpose of this study was to develop a *new* instrument with conceptual validity and reported reliability data, previous studies' failure to report these important coefficients is

irrelevant; other scholars' published instruments informed and supported the development of items in this instrument.

Whereas the author developed new questionnaire items supporting the three justice-oriented elements of the JSP the fourth facet of interest in the JSP addresses ecosystem limitations (see Appendix A) as they are considered in the pursuit of sustainable development (United Nations Division for Sustainable Development, 2015b; United Nations World Commission on Environment and Development, 1987). To address this content area, the author adapted items from the NEP (Dunlap et al., 2000) and the ACPA item bank (no date), and also generated new items meant to address respondents' perception of the immediacy of the environmental crisis, which in turn informs the need to act locally.

Pilot Studies

The study began in the fall of 2015, when the author began writing and revising the original 40 items for the first version of the *Just Sustainability Attitude Scale* (JSAS). The author began with a review of published instruments and items as discussed above to ensure understand how other scholars framed questions, connected items to theories of sustainability, and articulated questions succinctly and clearly. A first draft of the JSAS was discussed with the author's dissertation committee members for their feedback and input, which led to revisions addressing double-barreled items and ambiguous phrasing. Once these initial revisions were completed, the author received permission from the institutional review board and recruited undergraduate students from the university's Counseling & Human Development (CHDS) Research Pool to participate in a series of three focus-group interviews. In these focus groups, the researcher outlined the purpose of the study, briefly described the *just sustainability paradigm*, and then reviewed all 40 of the JSAS items with the students. The focus group

participants were asked to comment on whether they felt the items were accessible to traditional-aged college students, whether they felt the items reflected the constructs of interest, and how they felt the items might be revised for clarity. The focus groups' advice resulted in substantial feedback: the reverse-worded items in the original instrument were revised such that the final instrument has no reversed items; technical jargon was identified and eliminated; and double-loaded items were simplified. Following the focus groups, the second version of the JSAS was configured as a web-based questionnaire for use with a small sample for initial statistical analysis.

Pilot Questionnaires

In the late fall of 2015, the author presented this study design to his committee and received their approval to move forward with the collection of a preliminary round of pilot data using the JSAS in a web-based questionnaire. Once securing IRB approval in spring 2016, the author recruited a second sample of students ($n = 60$) from the CHDS research pool and invited them to complete the JSAS in a Qualtrics-based questionnaire. The responses to this questionnaire were examined using Facets (ver. 3.71.4) to apply the Rasch rating scale model (described in Chapter 5) to analyze the responses.

Pilot I Analysis

The Facets output file provided the modeled and empirical responses to the pilot JSAS; the data indicated strong reliability coefficients ($Rel_{stu} = .94,\ \chi^2(77) = 1136.6, p < .05$) and items ($Rel_{item} = .92,\ \chi^2(39) = 530.6, p < .05$), however examination of item fit statistics and distribution along the Wright map suggested revisions were warranted. Using these data, the researcher identified limitations in the instrument that required modification. The author edited 14 items from the original JSAS based on their high misfit values and apparent psychometric

redundancy, as well as to increase the "difficulty" of the instrument such that several items would require stronger pro-environmental values to respond to the item with "agree" or "strong agree".

After editing the 14 worst-performing items from the first edition of the JSAS, the author recruited a third sample of students ($n = 60$) from the CHDS research pool, with an invitation to complete the revised JSAS via a web-based questionnaire. The revised version demonstrated acceptable reliability coefficients ($Rel_{stu} = .95,\ \chi^2(59) = 970.5, p < .05$) and items ($Rel_{item} = .92,\ \chi^2(39) = 530.6, p < .05$). A side-by-side comparison of the Pilot I (Figure 2, left) and Pilot II (Figure 2, right) wright maps indicates that the revisions achieved the stated goal of increasing the breadth of item difficulty while maintaining strong reliability coefficients. Based on the results of the second pilot study, the author determined no further revisions were warranted and gained IRB approval to collect data from a larger, multi-institution sample, described below as the "major" data collection.

Major Study

Given the success in the second pilot of the 40-item questionnaire, the author determined that no further revisions were necessary before advancing to the major collection of data. During summer 2016, the author collaborated with institutional gatekeepers from Indiana State University (ISU), University of California at Davis (UCD), the University of Vermont (UVM), the University of Minnesota at Crookston (UMC), the curator of the instructors for 12 sustainability-related First-Year Odyssey Seminar courses at the University of Georgia (FYOS), and the University of. These gatekeepers facilitated the researcher's contact with random samples of undergraduate students, stratified by class year, from each of the four public

universities (UCD, UVM, UMC, ISU) and convenience samples from UMD, the FYOS classes, and the CHDS research pool.

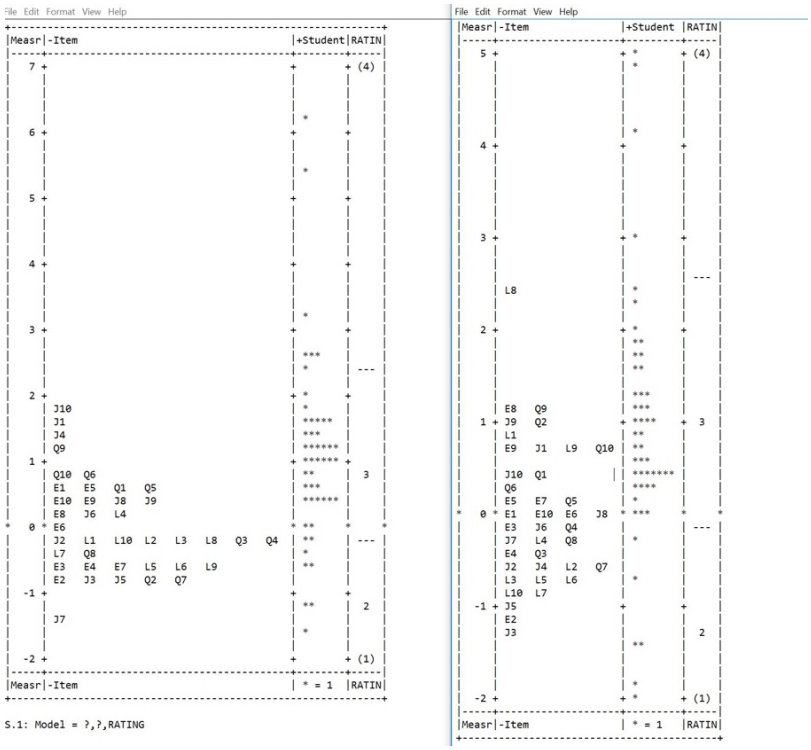


Figure 2
Comparison of Pilot I and Pilot II Wright maps

Because of the low response rate from students in the random samples (see Table 1), the author contacted the curators of the *University Leaders for a Sustainable Future* (ULSF) and the University of Georgia Counseling & Human Development (CHDS) research pool to arrange access to additional convenience samples in order to ensure the recommendation of 10 items per category was met (Linacre, 2002).

Data Collection

As with the two pilot studies, the major study was collected using Qualtrics to host and distribute the online instrument using the sampled students' personal email addresses and an IRB-approved recruitment letter. Students were advised that participation in the study would

take approximately 15 minutes, and at the end of the study they would be able to opt into a drawing for a $25 Amazon.com gift card.

Table 1
Sample Response Rates

Sample	N	*n*	Rate
University of Minnesota, Crookston	500	34	6.8%
University of Vermont	500	38	7.6%
University of California, Davis	500	34	6.8%
University of Georgia CHDS Research Pool	78	78	100.0%
Indiana State University	500	21	4.2%
University of Maryland	-	32	100%
University of Georgia First-Year Odyssey Seminar	-	42	100%

The samples from UCD, UMC, UVM, and the FYOS classes were contacted in the second week of August 2016 with the link to participate in the survey. Two reminder emails were transmitted to non-responders over the course of the following five weeks; because the rate of completed responses did not meet the researcher's expectations, the author conducted additional data collection with the ISU, UMD, and CHDS. Respondents from ISU and UMD were eligible for the same gift card drawing as those from UCD, UMC, UVM, and the FYOS classes; the CHDS research pool students receive course credit for participating in approved research studies.

The Rasch rating scale model analysis was conducted using the completed responses from 299 respondents (see Chapter 5 for analysis). The instrument used in this major collection was comprised of the full 40-item *Just Sustainability Attitude Scale* tested in Pilot II, as well as demographic items addressing race/ethnicity, gender, religion, class year, institutional affiliation, international student status, first-generation student status, age, and major field of study (see Appendix D).

Data Analysis

The data collection was closed in December 2016, after which the data files were downloaded from the Qualtrics website and cleaned prior to analysis using statistical software packages. After collecting the sampled students' responses, the data were analyzed using Facets (v. 3.71.4) to conduct the Rasch Rating Scale Model analysis of the responses to the JSAS; the findings from this analysis are described in the following chapter. In addition to the analysis of the item characteristics and instrument reliability coefficients, the researcher used SPSS (ver. 22.0.0.0) to perform analysis of variance in summed scale scores across demographic variables.

Conclusion

This chapter has reviewed the author's methods for data collection and analysis of responses to the *Just Sustainability Attitude Scale* (JSAS). The chapter explained the two phases of pilot studies which collected preliminary data about the performance of the JSAS, and which indicated necessary revisions to the instrument prior to its use in the major study conducted during fall 2016.

CHAPTER 5

RASCH ANALYSIS RESULTS

The purpose of this quantitative study was to develop and test the validity of an instrument that measures traditional-aged (18-24) college students' attitudes toward *just sustainability* (Agyeman, 2005) using researcher-developed items measuring respondents attitudes toward the construct (Andrich, 1978). In this chapter the author applies the Rasch Rating Scale model to analyze data collected over the course of fall 2016. This chapter begins with an analysis of the full 40-item *Just Sustainability Attitude Scale* (JSAS), a web-based questionnaire comprised of statements about environmental justice (see Appendix A) and requiring responses using one of four ordered options (Strongly Disagree, Disagree, Agree, Strongly Agree). Following this discussion, the four subscales (quality of life, equity for present and future generations, justice and equity, and living within ecosystem limits) are discussed separately, with focus on items whose poor performance or psychometric redundancy indicate revision or elimination from future versions of the JSAS. These discussions will address the research questions articulated in Chapter 1:

1. Do the four subscales ((a) quality of life, (b) equity for present and future generations, (c) justice and equity, and (d) living within ecosystem limits) adapted from Agyeman (2005, 2013) support a valid measurement of respondents' attitudes toward Just Sustainability?
2. Do the subscales independently comprise statistically reliable measures of their respective facets of Just Sustainability?

Just Sustainability Attitude Scale

This section outlines the performance of the full 40-item JSAS. For the purpose of this discussion, all 40 items were calibrated simultaneously using Facets v.3.71.4 (Linacre, 2012, 2013), rather than in four separate subscales as is discussed later in this chapter (see Appendix C for program syntax). The software allows the analysis of the reliability of item separation and person separation as well as fit statistics describing the performance of items relative to the model predictions. These statistics facilitate discussion of item performance, calibration, and revision as discussed in Chapter 4, and following the accepted standards for Rasch instrument calibration (Linacre, 1999).

Model-Data Fit

This analysis begins with an interpretation of the model-data fit, reporting variance explained by the model and reliability statistics; this reporting is followed by analysis of fit statistics and item characteristics (Linacre, 1999). A distinguishing feature of the Rasch model is its assumption the scale is unidimensional; items calibrated on the logit scale are measuring a single latent trait (in this case, endorsement of just sustainability). In this study the Rasch model accounted 36.85% of the variance in the data, which exceeds the accepted minimum of 20% (Reckase, 1979). The distribution of category statistics (i.e., percent responses by response option) is reported in Table 2.

Table 2
Rating scale category statistics

Score	Response	Category Total	%	Cum%	Avg. Measure
1	Strongly Disagree	520	4%	4%	-0.51
2	Disagree	2424	21%	25%	0.17
3	Agree	5480	48%	73%	1.01
4	Strongly Agree	3101	27%	100%	2.02

The very low rate of "strongly disagree" (4%) and high rate of "agree" response (48%) is noteworthy, and raises a concern that responses may be influenced by social desirability. If this were an achievement test rather than a measure of attitudes, this would indicate the instrument should be revised to include more items at higher difficulty levels. An alternative perspective to this conclusion may be that the "agree" category is influenced in part by social desirability *and* the potentially unbounded upper end of the "strongly agree" category (see Figure 3); because there is no limit to how "strongly" a respondent may agree, "agree" category may be more attractive to respondents (Linacre, 2002) in the context of the standard Likert scale.

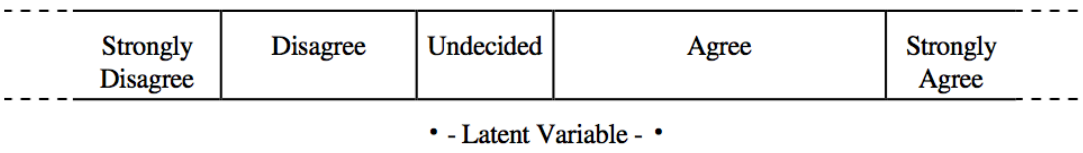


Figure 3
Likert Scale

An additional indicator of item quality is the average logit scale measure that contributed to the responses in that respective category; for example, the average measure for items resulting in "strongly disagree" was -0.51, whereas the average measure for items resulting in "agree" was 1.01; these average measures are expected to increase with each response category (1-4).

The full 40-item instrument demonstrated good separation of students ($Rel_{stu} = .92$, $\chi^2(298) = 3222.4, p < .05$), which can be interpreted as a reliability coefficient (i.e., Cronbach's $\alpha = .92$). These values indicate the instrument is sensitive to differences in the strength of respondents' attitudes toward the latent trait. In addition to this strong reliability coefficient, the Rasch analysis generated a strong separation of items in terms of their ordering

and distinctiveness ($Rel_{Item} = .99,\ \chi^2(39) = 2593.6, p < .05$), indicating the separation and ordering of items by measurement value is meaningful.

As indicated in Table 3, the Rasch-Andrich thresholds the difficulty to advance from one step (e.g., Strongly Disagree) to the next ("Disagree") are separated by more than the 1.4 logits recommended (Bond & Fox, 2015).

Table 3
Rasch-Andrich Thresholds

Score	%	Avg. Meas.	Exp. Meas.	Outfit	Rasch-Andrich Threshold
1	4%	-0.51	-0.84	1.3	
2	21%	0.17	0.22	1	-1.89
3	48%	1.01	1.06	0.9	-0.17
4	27%	2.02	1.95	1	2.06

While the category response rates are informative, a comparison of the modelled and empirical responses relative to item difficulty also indicates a good fit (see Figures 4 and 5). In Figure 4, the empirical and modelled response probability curves are displayed: the smooth lines represent the modelled curves generated by Facets using the 40-item JSAS data, whereas the "scored" category lines represent the observed responses. The vertical axis in this figure represents the probability of a response, with a range of 0 to 1. The horizontal axis represents item "difficulty"; thus, the probability *P* of response *k* on item *i* given person location θ_n is represented. The Rasch-Andrich thresholds reported in Table 3 represent the points at which the response category curves cross. For example, the threshold between "Strongly Disagree" and "Disagree" (-1.89) is visible in Figure 4 as the point where the smooth red (Category Probability: 1) and blue (Category Probability: 2) ogives cross at .5 category probability and -1.89 logits. Visual inspection of the empirical curves' deviations from the modelled curve appear to indicate

some responses in the response categories 1 and 2 that were not predicted by the model, whereas in categories 3 and 4, the observed responses fit the predicted responses much better.

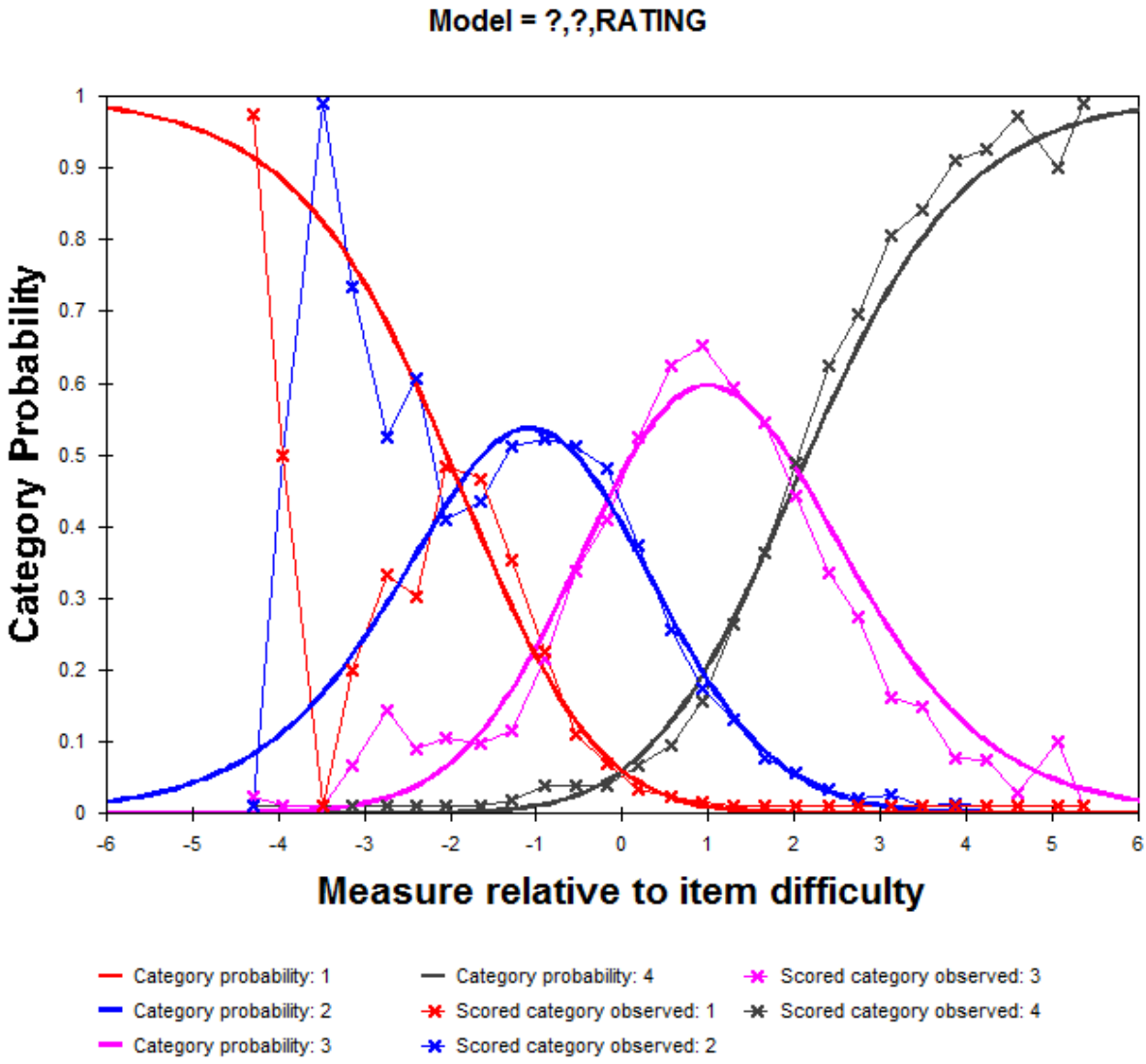


Figure 4
Empirical and Modelled Response Probability Curves

In Figure 5 (below), the empirical and modelled item characteristic curves are displayed. As with Figure 4, the responses observed at the lower levels of item difficulty occur more frequently than predicted by the model.

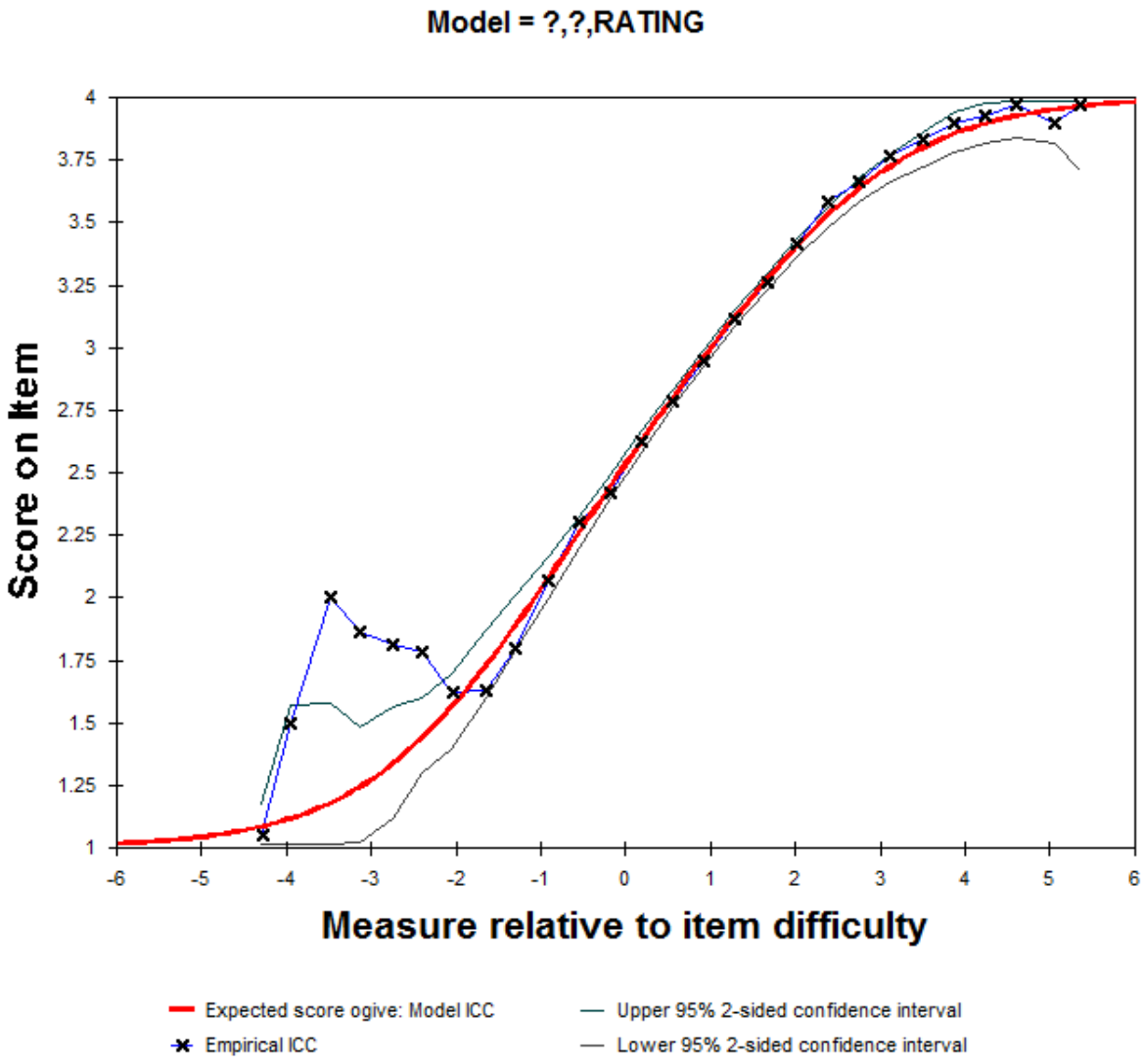


Figure 5
Empirical and Modelled Score Item Characteristic Curves

In Figure 6 (below), the expected score (vertical axis) for a respondent at given item difficulty level (horizontal axis) is represented. This plot includes dashed lines indicating the .5 probability threshold for response on an item given person ability and item difficulty. This display may be used for the purpose of inferring person ability given a known response on an item, or to infer item difficulty given the ability of the person and the score reported (Linacre, 2013).

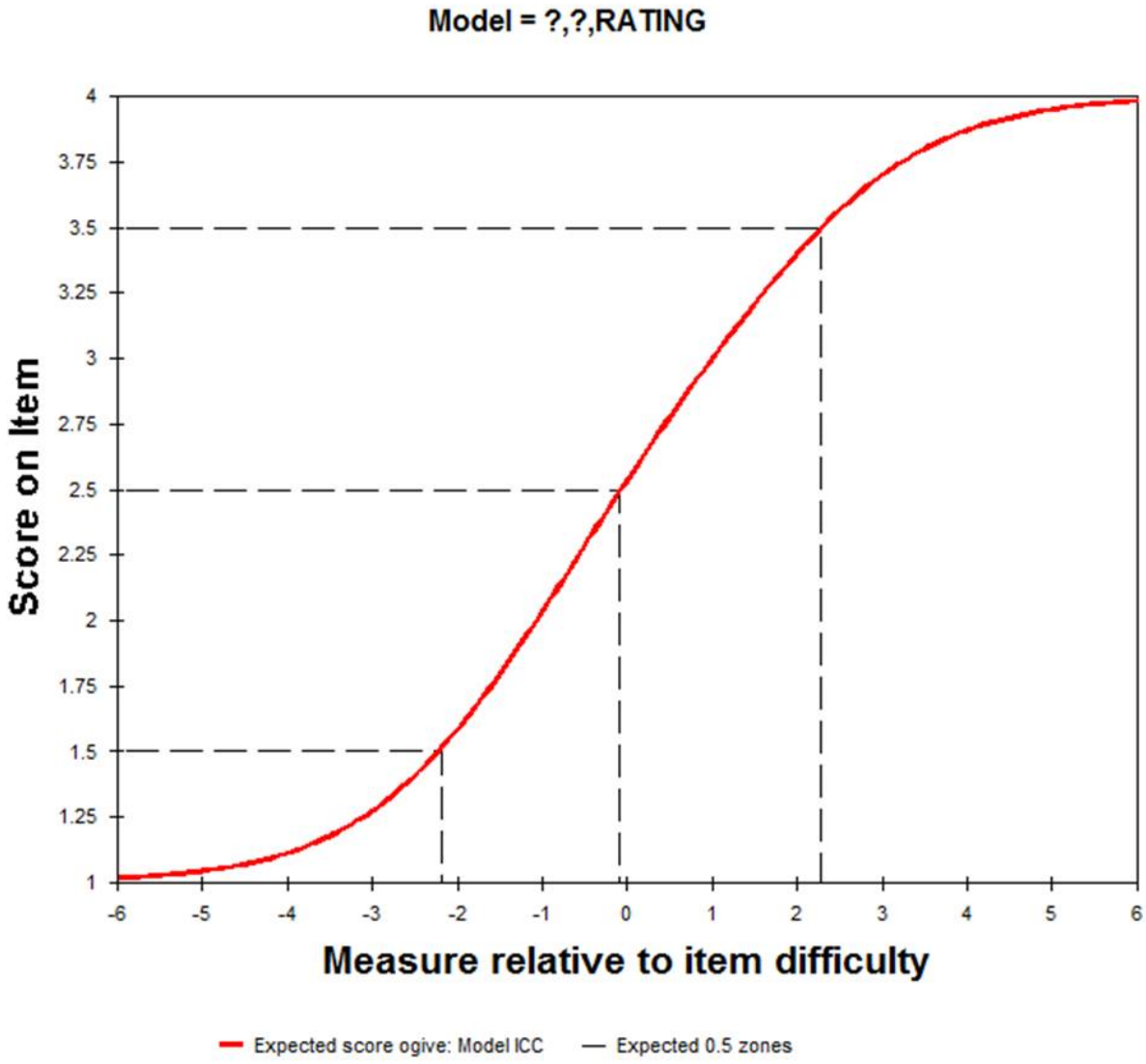


Figure 6
Expected Score Item Characteristic Curve

Figure 7 represents the conditional probability curves generated using the data collected in this study. These ogives represent the probability of observing adjacent response categories (i.e., the red ogive represents the probability of "strongly disagree" or "strongly agree"); as expected, these probability curves do not cross.

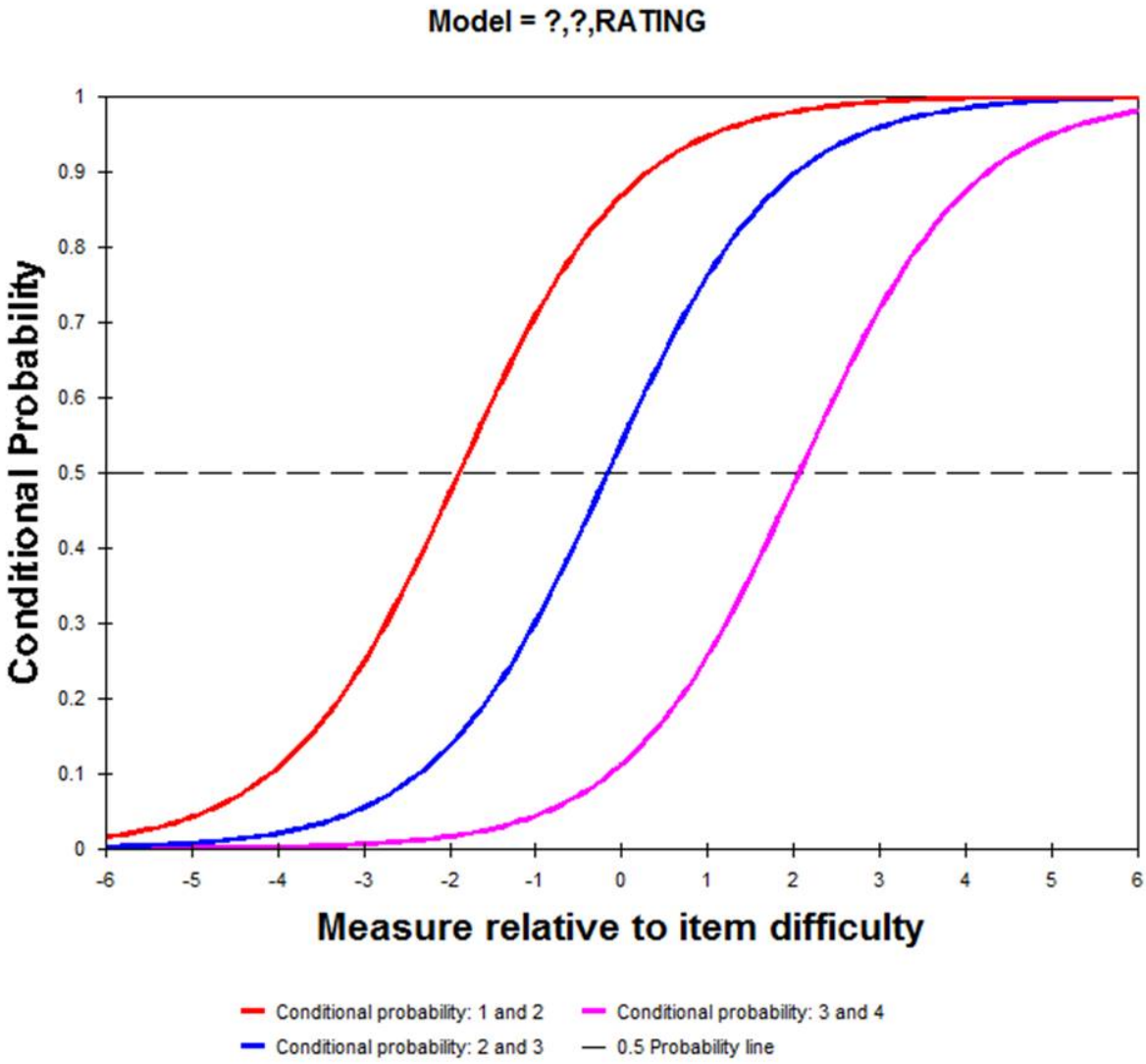


Figure 7
Conditional Probability Curves

The Wright map (see Figure 8) displays the order of items and persons on the logit scale. The "Measr" column displays the logit scale upon which the items are calibrated and with which respondent scores are indicated. The "-Item" column represents the placement of all 40 JSAS items arranged along the logit scale in order of increasing difficulty to endorse. Items E2 and J3,

for example, are located lowest on the map (below -1 logit), indicating they are *easiest* to endorse (see Appendix A for item statistics). Respondents with very week pro-environmental attitudes who disagree with the pro-environmental stance of the JSAS may still find they agree with these "easier" statements. Items plotted higher on the map are considered progressively more difficult to endorse.

In the "+Student" column each "*" indicates 3 respondents, and each "." indicates one respondent. Respondents are ordered here in terms of how strongly they endorse *just sustainability* as it is measured in this instrument. With a visual inspection of the Wright map, the reader can see that the items are fairly evenly distributed, as are the respondents. The respondents' mean is slightly greater than the item difficulty mean, indicating that the items in the aggregate may be somewhat too easy to endorse.

The results here indicate that while the items are reliably separated and distinctly ordered, the instrument would benefit from revision to better target respondents who fall lower on the Wright map (latent trait), increasing the probability of "strongly disagreeing' with more statements regarding environmental justice and resulting in an instrument with a wider distribution of items by difficulty.

In addition to the review of model-data fit and the Wright map, Rasch instrument development requires analysis of item fit characteristics. The values of interest here are Infit and Outfit values for each item (see Appendix A.). Infit is an information-weighted statistic that is sensitive to unexpected responses on items whose measure is close to respondents' modelled ability; conversely, Outfit values (outlier weighted) indicate unexpected responses on items whose measures are further from the respondent (Bond & Fox, 2015; Campbell, Wright, & Linacre, 2002; Engelhard, 2013). For attitudinal rating scales, Infit values between 0.6 and 1.4

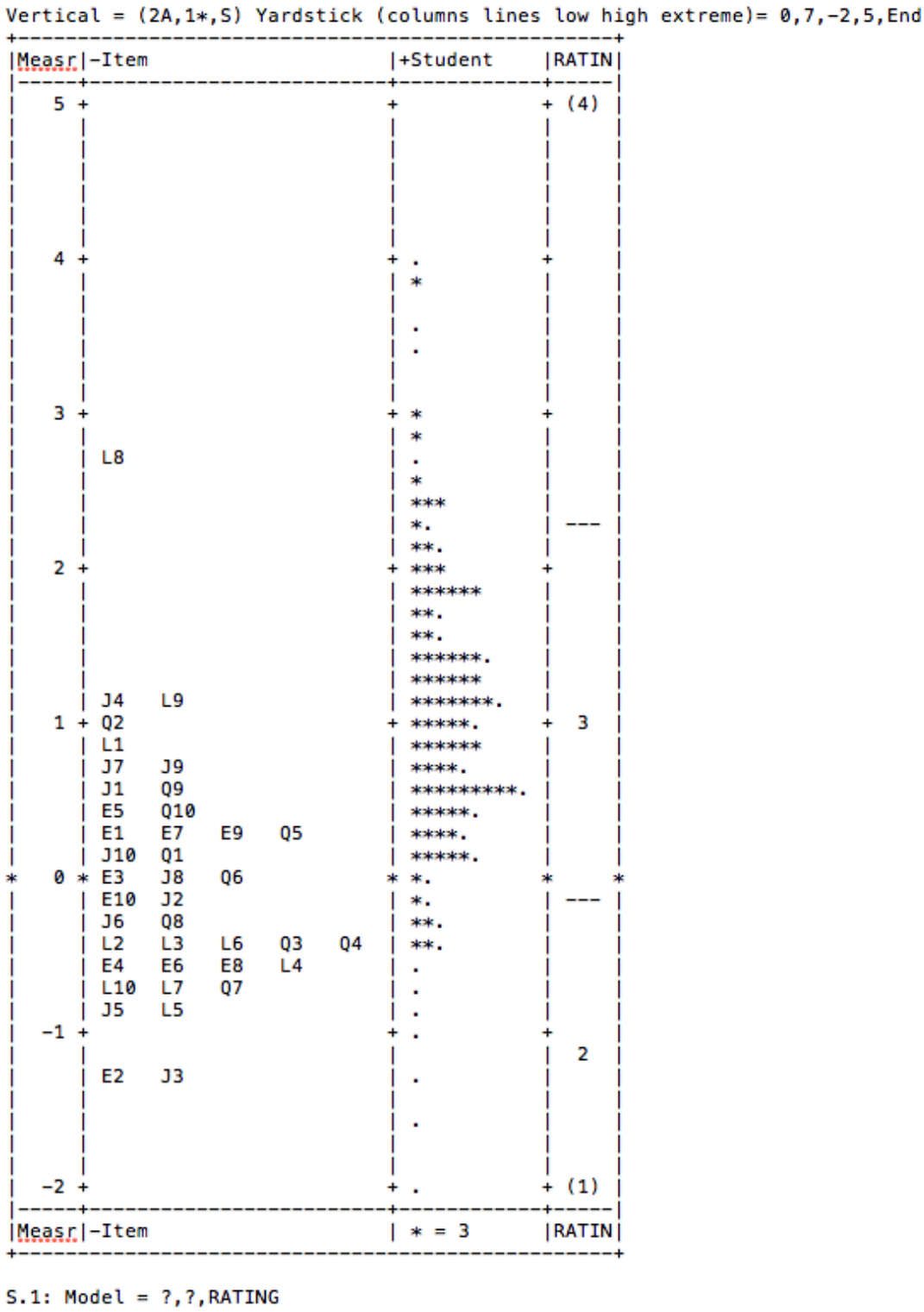


Figure 8
Wright Map for Just Sustainability Attitude Scale

are recommended; this range is wider than the recommended range for higher-stakes achievement tests, which warrant a narrower range of 0.8 to 1.2 (Bond & Fox, 2015; Linacre & Wright, 1994). A complete list of the 40 JSAS items with logit scale measures, fit statistics, and point-biserial correlations is provided in Appendix A.

Item Quality

Because only three JSAS items had fit values outside the desired range, they are addressed specifically here. In all three cases, the Infit values were greater than 1.4; these high values indicate erratic responses that fall outside the desired Guttman pattern, and may indicate respondents are guessing or misunderstanding the items.

As indicated in Table 4, two items with high misfit values also exhibited negative point-biserial correlations in the full JSAS. The point-biserial correlation value functions as an indicator of the item's alignment with the measured trait (Bond & Fox, 2015). While negative correlations were very weak for item E7 (-.04) and moderately weak for L8 (-.21), their negative values indicate respondents are misunderstanding the items because JSAS items share the same polarity (Linacre, 2002), thus a negative point-biserial correlation is unexpected. All other JSAS items (including E6) demonstrated positive point-biserial correlations greater than .30.

Examining item misfit. Three items indicated Infit values exceeding the misfit criteria selected here see (Table 4). The subscale E items both address the role of social injustices and the privilege of the developed world in the context of *just sustainability*, which argues that environmental injustice arises from the dynamics of power and privilege that perpetuate racism and classism, among other injustices. Thus, this subscale is designed to address the influence of class and race issues on environmental justice. Items E6 and E7 set up a false dichotomy between local and global issues; attention on "local problems" does not necessarily indicate

"global" problems are less important or should be ignored. Item L8 was the statement most difficult to endorse in both the spring 2016 and fall 2016 samples (spring measure = 2.38, Infit mean square = 2.11; fall measure = 2.78 logits, Infit mean square= 1.61), and had the highest misfit values. These data indicate the item is so problematic it should be dropped from future versions of the instrument, or completely reworded; its wording appears confusing to respondents and is leading to highly erratic responses.

Table 4
Items demonstrating poor fit

Item	Item Language	Measure	Model S.E.	Infit MnSq	Outfit MnSq	Discrim	PtBs Corr
E6	Local problems (like poverty and nutrition) are as important as global climate change.	**-0.50**	0.09	1.46	1.54	.46	.32
E7	Environmental activists must resolve local environmental issues before worrying about other countries' problems.	**0.31**	0.09	1.50	1.60	.32	-.04
L8	It is too late to do anything about climate change.	**2.78**	0.10	1.61	1.85	-.04	-.21

Invariance Across Samples. As this study is focused on the development of an instrument whose measurement properties are invariant across samples, this section addresses a comparison of JSAS items' performance in the second spring 2016 pilot study (n = 60) with the data collected in the full collection conducted over fall 2016 (n = 299). The JSAS Rasch rating scale model calibration results are summarized in Table 5. Because these data are calibrated separately, item difficulty measured in logits cannot be treated as equivalent, although the items' relative difficulty within the scale (and thus, arrangement along the Wright map) are expected to be similar. However, in both samples the reliability of separation for persons and items are acceptable (Bond & Fox, 2015; Crocker & Algina, 1986; Engelhard, 2013).

Table 5
Comparison of Spring and Fall Collection Summary Statistics

	Pilot Spring 2016		Collection Fall 2016	
	Students	**Items**	**Students**	**Items**
Measure				
M	0.80	0.00	1.03	0.00
SD	1.18	0.73	1.03	0.76
N	60	40	299	40
Infit				
M	1.01	0.98	1.03	0.99
SD	0.46	0.32	0.51	0.23
Outfit				
M	0.99	0.99	1.03	1.02
SD	0.44	0.36	0.51	0.26
Separation Statistic				
Rel.	.95	.92	.92	.99
χ^2	970.50*	484.90*	3322.40*	2593.60*
df	59	39	298	39

*$p < .05$

Subscale Calibration

To address research question 2 and to understand which items are best candidates for revision or exclusion from the instrument in future studies, the four subscales were analysed separately. The Wright variable maps for all four subscales can be found in Appendix B, and a table of summary statistics comparing all four subscales can be found in Table 6. The following sections briefly review the rating scale model analysis for each of the four JSAS subscales, calibrated independently.

Table 6
Subscale Summary Statistics for Students and Inventory Items

	Subscale J		Subscale E		Subscale L		Subscale Q	
	Stu	**Item**	**Stu**	**Item**	**Stu**	**Item**	**Stu**	**Item**
Measure								
M	1.17	0.00	1.28	0.00	1.04	0.00	1.09	0.00
SD	1.32	0.84	1.14	0.56	1.10	1.17	1.46	0.58
N	299	10	299	10	297	10	297	10
Infit								
M	1.01	0.99	1.03	1.00	1.01	1.00	1.02	0.98
SD	0.64	0.18	0.65	0.24	0.64	0.25	0.72	.014
Outfit								
M	0.99	0.99	1.01	1.00	1.02	1.01	1.01	1.01
SD	0.62	0.17	0.64	0.26	0.67	0.28	0.73	0.15
Separation Statistic								
Rel.	.80	.99	.74	.97	.74	.99	.83	.97
χ^2	1130.2*	683.1*	1002.1*	308.9*	957.1*	1427.3*	1397.0*	353.4*
df	298	9	298	9	296	9	296	9

*$p < .05$

Subscale J. The *justice and equity* subscale items focus on the moral, ethical dimensions of environmental justice and the role of social identities (e.g., race, class, gender) in the *just sustainability* construct. Using Facets to analyse the subscale J items separately, the Rasch model explained 41.18% of the variance, which more than exceeds Reckase's (1979) 20% threshold. The subscale score (M = 2.94, SD = 0.78) is close to the 40-item scale values (M = 2.98, SD = 0. 08). The subscale reliability of separation for persons ($Rel_{stu} = .80,\ \chi^2(298) = 1130.2, p < .05$) and items ($Rel_{item} = .99,\ \chi^2(9) = 683.1, p < .05$) are acceptable, although given the smaller number of items the reliability of person separation is understandably less reliable. Given that the subscale items' Infit values fall within the range prescribed by Bond and Fox (2015), and the items' separation and ordering along the logit scale, there appears to be little rationale for significantly modifying the subscale J items at this point.

Table 7
Subscale J Item Characteristics

Obsvd Avg	Measure	Model S.E.	Infit MnSq	Outfit MnsSq	Estim Discrm	Corr Pt.Bis	Item
2.70	0.66	0.10	0.96	0.96	1.05	0.56	J1
3.04	-0.25	0.10	1.08	1.07	0.91	0.31	J2
3.46	-1.55	0.11	0.84	0.87	1.17	0.42	J3
2.49	1.22	0.09	0.98	0.98	1.02	0.40	J4
3.33	-1.11	0.11	0.75	0.79	1.24	0.36	J5
3.08	-0.37	0.10	0.78	0.76	1.28	0.63	J6
2.66	0.8	0.09	1.01	1.13	0.86	0.40	J7
3.01	-0.16	0.10	1.01	0.99	1.01	0.45	J8
2.68	0.75	0.09	1.00	1.00	1.00	0.50	J9
2.95	0.01	0.10	1.38	1.37	0.59	0.42	J10

Subscale E. The Rasch model explained 33.4% of the variance in subscale E, which is acceptable considering the 20% minimum value (Reckase, 1979). The subscale score (M = 3.05, SD = 0.76) is close to the 40-item scale values (M = 2.98, SD = 0.08). The subscale reliability of separation for persons ($Rel_{stu} = .75,\ \chi^2(298) = 1002.1, p < .05$) and items ($Rel_{item} = .97,\ \chi^2(9) = 308.9, p < .05$) are acceptable, although the person separation statistic is not as strong as in subscales J and Q, nor as strong as the full 40-item scale. In addition to its negative point-biserial correlation, item E7 is the only item whose Infit values exceed Bond and Fox's recommended range; these indicators of poor item performance are consistent with the item performance in the 40-item calibration, suggesting additional revision. Future revisions may include increasing the range of item difficulty in response to the relatively narrow distribution of items on the Wright map relative to the student ability

Table 8
Subscale E Item Characteristics

Obsvd Avg	Measure	Model S.E.	Infit MnSq	Outfit MnsSq	Estim Discrm	Corr Pt.Bis	Item
2.86	0.51	0.09	1.02	1.03	0.98	0.41	E1
3.46	-1.18	0.11	0.71	0.67	1.37	0.59	E2
3.00	0.17	0.10	0.96	0.96	1.06	0.53	E3
3.22	-0.43	0.10	0.74	0.72	1.34	0.57	E4
2.78	0.68	0.09	1.22	1.23	0.75	0.35	E5
3.19	-0.34	0.10	1.32	1.31	0.66	0.31	E6
2.85	0.53	0.09	1.45	1.52	0.41	-0.02	E7
3.21	-0.4	0.10	0.78	0.78	1.26	0.47	E8
2.87	0.48	0.09	0.8	0.79	1.26	0.52	E9
3.06	-0.02	0.09	0.98	1.01	1.03	0.38	E10

Subscale L. The items in the *living within ecosystem* limits subscale items were influenced by the New Ecological Paradigm (NEP) scale (Dunlap & Van Liere, 1978; Dunlap et al., 2000) and address the relationship between humans, non-human species, and anthropogenic climate change. Using Facets to analyse the items, the Rasch model explained 49.80% of the variance. The subscale score (M = 2.94, SD = 0.87) is close to the 40-item scale values (M = 2.98, SD = 0. 08). The subscale reliability of separation for persons ($Rel_{stu} = .74,\ \chi^2(296) = 957.1, p < .05$) and items ($Rel_{item} = .99,\ \chi^2(9) = 1427.3, p < .05$) are within the limits described above. Notably, item L8 ("It is too late to do anything about climate change") continues to fall at the top end of the Wright map and as in the full 40-item version of the JSAS, this item has misfit values greater than the accepted range (Infit mean square = 1.57, Outfit mean square = 1.73), as well as a negative point-biserial correlation (-.21) in this subscale calibration, as it did with the full 40-item JSAS.

Table 9
Subscale L Item Characteristics

Obsvd Avg	Measure	Model S.E.	Infit MnSq	Outfit MnsSq	Estim Discrm	Corr Pt.Bis	Item
2.62	0.79	0.09	0.86	0.86	1.17	0.44	L1
3.14	-0.47	0.09	1.07	1.11	0.92	0.34	L2
3.16	-0.52	0.09	1.27	1.23	0.74	0.38	L3
3.22	-0.68	0.10	0.83	0.82	1.26	0.60	L4
3.34	-1.01	0.10	0.72	0.72	1.33	0.49	L5
3.15	-0.50	0.10	0.89	0.91	1.16	0.50	L6
3.26	-0.80	0.10	0.76	0.81	1.27	0.44	L7
1.73	2.90	0.10	1.57	1.73	0.11	-0.21	L8
2.51	1.05	0.09	0.95	0.95	1.07	0.40	L9
3.25	-0.77	0.1	1.03	0.98	1.02	0.48	L10

Subscale Q. Results indicate the Rasch model explains Facets to analyse the subscale-J items separately, the Rasch model explained 41.36% of the variance; the subscale score (M = 2.94, SD = 0.79) is close to the 40-item scale values (M = 2.98, SD = 0. 08). Subscale Q reliability of separation for persons ($Rel_{stu} = .83,\ \chi^2(296) = 1397.0, p < .05$) exceeds that of Subscales L, E, and J, and separation of items ($Rel_{item} = .97,\ \chi^2(9) = 353.4, p < .05$) also indicates strong. All subscale items' misfit values fall within range (.6 to 1.4) established above. A review of the Wright map and the distribution of responses by category (51% of responses on Subscale Q fell in the "Agree" category) may indicate the subscale items could benefit from future revision to increase the spread of item difficulty, with focus on increasing the difficulty on items Q4, Q5, Q6, and Q8, whose locations on the Wright map indicate some psychometric redundancy.

Table 10
Subscale Q Item Characteristics

Obsvd Avg	Measure	Model S.E.	Infit MnSq	Outfit MnsSq	Estim Discrm	Corr Pt.Bis	Item
2.95	0.04	0.10	0.99	1.03	0.99	0.48	Q1
2.54	1.09	0.09	0.88	0.89	1.11	0.57	Q2
3.16	-0.58	0.10	1.00	1.05	1.00	0.48	Q3
3.14	-0.51	0.10	0.73	0.75	1.29	0.54	Q4
2.86	0.29	0.09	1.11	1.19	0.85	0.46	Q5
2.98	-0.07	0.10	1.13	1.12	0.85	0.56	Q6
3.25	-0.87	0.11	0.81	0.86	1.21	0.48	Q7
3.11	-0.42	0.10	0.88	0.87	1.14	0.49	Q8
2.73	0.62	0.09	1.14	1.14	0.85	0.53	Q9
2.81	0.41	0.09	1.14	1.17	0.83	0.53	Q10

Analysis of Responses

In this section, responses to the JSAS are analyzed. The researcher used SPSS ver. 22.0.0.0 to generate scale and subscale total scores, and to recode responses to categorical variables (e.g., major, gender) for analysis. In the sections below, responses on the scale and subscales, as well as differences across demographic variables are examined.

Descriptive Statistics

As discussed in Chapter 3, it is important to note *who* the respondents to the instrument were, in addition to how they responded. While not all respondents completed the demographic variables when responding to the questionnaire, data were collected in multiple waves; those who did identify reported they were enrolled in University of Georgia First-year Odyssey Seminar (FYOS) classes (n = 42), the University of California, Davis (UCD, n = 34), University of Minnesota at Crookston (UMC, n = 34), and University of Vermont (UVM, n = 106), the University of Georgia Counseling & Human Development Research Pool (CHDS, n = 78), the University of Maryland (UDM, n = 32), and Indiana State University (n= 21). When indicating

their year class year, 80 (28.5%) indicated they were first-year students, 43 (15.3%) were sophomores, 76 (27%) were juniors, 59 (21%) seniors, 14 (5%) were fifth year (or later) undergraduate students, and 7 (2.5%) were graduate or professional students. Of the students who indicated their gender, 81 (28.8%) indicated male, 3 (1.1%) indicated transgender, and 194 (69%) indicated female. The demographics questions also captured first-generation student status: 51 (18.1%) were first-generation students, whereas 225 (80.1%) claimed a parent/guardian had completed a 2- or 4-year degree. Six students indicated they were international students, whereas 273 (97.2%) indicated they were not. The questionnaire also captured students' majors (see Table 11).

Table 11
Survey Respondents by Major

Major	**N**	**%**
Business & Economics	53	19%
Liberal Arts (e.g., English, Foreign Languages, Music, Art, and Art History	20	7%
Physical Sciences (e.g., Biology, Chemistry, Physics)	99	36%
Social Sciences (e.g., Political Science, Sociology, Psychology)	71	26%
Technology, Engineering, and Math	35	13%
Total	278	100%

While the scale and subscale scores have been discussed in the context of item calibration above, here they are addressed in terms of what they indicate about the students who took the questionnaire. Overall, the sampled students' responses favored agreement with JSAS items in both the full instrument and in the subscales, indicating endorsement of Agyeman's *just sustainability* (see Table 2 for distribution of responses). This high rate of "Agree" and "Strongly Agree" responses with the tenets of just sustainability mirrors national norms for college students reported by the Higher Education Research Institute (HERI) through annual reports; these reports indicate college students' attitudes toward social and environmental issues

are increasingly liberal from year to year (Eagan et al., 2015; Eagan et al., 2014). In their 2016 summary of the past fifty years' trends in student attitudes toward environmental issues, the authors indicate that students' responses on strictly *environmental* issues (e.g., pollution, federal responsibility for climate change) have diminished slightly as these issues have become more polarized across partisan differences (Eagan et al., 2016); although the data described in this chapter did not include political orientation, the JSAS respondents' endorsement (48% agree and 27% strongly agree) of *just sustainability* is congruent with the 61.7% of students in 2014 who favored government response to climate change as an indicator of pro-environmental attitudes (Eagan et al., 2016).

Variance Across Demographics

Although differences in JSAS scores across the demographic variables are not directly related to the research questions, some differences are noteworthy. In this section, significant results ($p < .05$) from the ANOVA tests run on the scale and subscale scores. Not all demographic variables varied significantly (i.e., age, gender, religious background, and class year) did not vary. The university from which students were randomly sampled, however, did generate significant difference on the scales and subscales (see Table 12). In addition to the significant differences across institution, the data also indicated differences in attitudes toward the scale and subscales based on major (see Table 13).

Table 12
Analysis of Variance by Respondents' Institutions

Scale	University	*N*	*M*	*SD*	*Min*	*Max*	*df1*	*df2*	*F*	*p*
JSAS	UMC	34	112.35	14.27	88	141	6	272	6.09	<.001
	UVM	38	125.00	14.08	81	151				
	UCD	34	120.03	14.69	75	153				
	UGA	78	113.79	14.93	73	153				
	ISU	21	120.05	17.97	90	154				

	UMD	32	127.22	9.02	111	146				
	FYOS	42	117.10	12.79	77	146				
J	UMC	34	27.85	3.84	21	37	6	272	4.553	<.001
	UVM	38	31.00	4.27	20	40				
	UCD	34	29.50	3.64	22	40				
	UGA	78	28.37	4.16	17	38				
	ISU	21	29.71	5.02	22	40				
	UMD	32	31.44	3.29	26	38				
	FYOS	42	28.52	3.33	18	36				
Q	UMC	34	27.09	4.87	15	36	6	272	7.191	<.001
	UVM	38	32.00	4.30	19	40				
	UCD	34	29.82	4.73	16	40				
	UGA	78	28.09	4.58	15	40				
	ISU	21	29.71	5.95	26	40				
	UMD	32	32.44	3.28	19	39				
	FYOS	42	28.78	4.30	15	39				
E	UMC	34	29.26	3.67	24	40	6	272	4.612	<.001
	UVM	38	31.63	3.64	21	38				
	UCD	34	30.94	3.91	23	38				
	UGA	78	29.10	4.30	18	39				
	ISU	21	31.14	4.62	22	39				
	UMD	32	32.53	2.38	28	38				
	FYOS	42	30.48	3.34	19	36				
L	UMC	34	28.15	3.98	19	36	6	272	2.927	0.009
	UVM	38	30.37	3.74	21	36				
	UCD	34	29.76	4.85	14	36				
	UGA	78	28.23	3.48	20	36				
	ISU	21	29.48	4.57	21	37				
	UMD	32	30.81	2.74	25	35				
	FYOS	42	29.31	3.84	21	36				

Table 13
Analysis of Variance by Major

Scale	Major	*N*	*M*	*SD*	*Min*	*Max*	df1	df2	*F*	*p*
JSAS	Nonresponse	3	107.33	4.04	103	111	5	275	2.784	0.018
	Bus/Econ	53	113.17	15.57	73	146				
	Liberal Arts	20	119.00	16.27	92	151				
	Physical Sciences	99	118.06	14.57	75	153				
	Social Sciences	71	120.28	15.01	81	154				
	Tech., Eng. Math	35	123.43	11.40	92	146				
J	Nonresponse	3	27.00	2.65	25	30	5	275	2.836	0.038
	Bus/Econ	53	27.81	4.16	17	36				
	Liberal Arts	20	29.80	3.99	24	37				
	Physical Sciences	99	29.20	4.08	18	40				
	Social Sciences	71	29.80	4.19	20	40				
	Tech., Eng. Math	35	30.34	3.48	22	38				
Q	Nonresponse	3	26.00	1.732	24	27	5	275	2.19	0.056
	Bus/Econ	53	28.04	5.072	15	39				
	Liberal Arts	20	29.60	6.48	15	40				
	Physical Sciences	99	29.13	4.90	16	40				
	Social Sciences	71	30.46	4.44	19	40				
	Tech., Eng. Math	35	30.31	3.52	20	37				
E	Nonresponse	3	27.67	2.08	26	30	5	275	2.546	0.028
	Bus/Econ	53	29.06	4.14	18	37				
	Liberal Arts	20	30.35	4.26	24	38				
	Physical Sciences	99	30.46	3.77	19	40				
	Social Sciences	71	30.97	4.07	21	39				
	Tech., Eng. Math	35	31.60	3.21	22	38				
L	Nonresponse	3	26.67	2.31	24	28	5	275	2.73	0.019
	Bus/Econ	53	28.26	3.72	20	36				
	Liberal Arts	20	29.25	3.89	23	36				
	Physical Sciences	99	29.26	3.93	14	37				
	Social Sciences	71	29.04	4.10	18	36				
	Tech., Eng. Math	35	31.17	3.33	23	36				

Conclusion

With regard to the first research question, these data support the claim that the current version of the JSAS does indeed constitute a valid and reliable measure of college students'

attitudes toward just sustainability (Agyeman, 2013). Furthermore, the analysis of the subscale data indicates these four discrete subscales may be used as independent measures of attitudes toward the elements of just sustainability Agyeman articulated (2013); thus, the researcher may conclude that research question 2 has been addressed. There is clear evidence that although the reliability data meet accepted standards (American Educational Research Association et al., 2014; Bond & Fox, 2015; Crocker & Algina, 1986; Engelhard, 2013), the distribution of responses and the high rate of agreement across all items indicates there is further room for revision to increase item difficulty and reduce psychometric redundancy. These data indicate additional calibration with a more diverse sample, as well as revision of the items identified as having poor misft are appropriate next steps for researchers and educators interested in using the JSAS.

CHAPTER 6

DISCUSSION

Student affairs administrators in the United States embrace program assessment as an important step in development and evaluation of programs and services promoting student learning and development (American College Personnel Association & National Association for Student Personnel Administrators, 2015; Upcraft & Schuh, 1996). When the assessment of student learning is conducted using quantitative measures such as the survey instrument developed in this study, it is important for the instrument to demonstrate reliability sufficient to support the strategic and programmatic decisions that follow from the assessment activity. Thus, in this study the author's focus is on the reliability and validity of the instrument developed, and the quality of the items that constitute the questionnaire.

The purpose of this study was to develop and report on the psychometric properties of a new measure of college students' attitudes toward *just sustainability* (Agyeman, 2013), called the *Just Sustainability Attitude Scale* (JSAS). In this chapter, the results of the study are summarized, followed by a discussion of the sampling procedures and what limitations may be surmised based on the participants involved in the study. These summaries are followed by a discussion of implications for practice as well as directions for future research into *just sustainability* in student affairs research and practice.

Results

As discussed in Chapter 5, the *Just Sustainability Attitude Scale* (JSAS) full 40-item form demonstrates validity and appropriate reliability coefficients for use as a survey instrument

(Bond & Fox, 2015; Crocker & Algina, 1986; Engelhard, 2013; Messick, 1995). Because the questionnaire items were grounded in the just sustainability paradigm they operationalize the abstract justice framework for justice described in Chapter 3 (Agyeman, 2013; Agyeman et al., 2002; Agyeman & Crouch, 2004; Dunlap & Catton, 1979; Dunlap & Van Liere, 1978; Dunlap et al., 2000; D. E. Taylor, 2000); the claim of their validity is further supported by the interviews and focus groups conducted with the target population and subject area experts (Messick, 1995). This focus group process ensured the items were accessible and relevant to college students. Below, the psychometric properties of the full 40-item JSAS are discussed first, followed by a brief discussion of the four subscales calibrated independently.

Just Sustainability Attitude Scale

In response to research questions, the study design applied the Rasch IRT measurement model (Bond & Fox, 2015; Engelhard, 2013) to the JSAS responses collected via web-based questionnaire over the course of fall 2016. The Rasch analysis, conducted using Facets ver. 3.71.4, allows researchers to understand not only the reliability of the questionnaire, but the relative difficulty of items, assuming the item difficulty is invariant across samples. As described in the previous chapter, the results of this analysis indicate the full 40-item scale has strong reliability ($\alpha = .92$). Additionally, the reliability of item separation ($Rel_{Item} = .99$, $\chi^2(39) = 2593.6, p < .05$) and the distribution of items along the Wright map indicate users of the JSAS may draw conclusions about test-takers' attitudes toward just sustainability based on their responses to the JSAS.

Three items on the 40-item scale appear problematic and deserve further scrutiny, based on their misfit values: items E6, E7, and L8 all have Infit mean square values outside of the 0.6-1.4 range established for rating scales (Bond & Fox, 2015; Linacre & Wright, 1994) calibrated

using the Rasch rating scale model. These items' high Infit and Outfit values indicate the observed responses did not mirror the modeled responses; these erratic responses indicate respondents are guessing or misinterpreting the items. In addition to those three items whose performance warrants further investigation based on misfit statistics, the distribution of responses is noteworthy. In addition to these extreme fit statistics, item L8 – which exhibited the highest Infit and Outfit values - falls an entire logit above the next highest items on the Wright map. The item's high fit statistics and difficulty measure in this sample is consistent with observations in the previous two collections of pilot data, indicating the researcher's attempts at revising the item did not achieve the goal of clarifying the item while maintaining its' relatively high "difficulty".

The respondents in this study overwhelmingly "agreed" with the items on the scale; 21% of responses fell in the "disagree" category, 48% fell in the "agree" category, and 27% in the "strongly agree". Only 4% of responses were marked "strongly disagree"; only 25% of responses to the instrument fell in the disagree or strongly disagree bins. These responses are more pro-environmental than national norms would lead the researcher to expect (Eagan et al., 2015; Eagan et al., 2016) indicating the influence of the homogeneity of the sample as well as the specter of social desirability. Although the instrument overall demonstrates strong reliability and the items are appropriately distributed in terms of relative difficulty, there is clear room for further revision to the instrument.

Subscale Findings

In response to research question three, the Rasch rating scale model was applied to each of the four subscales to examine their value as statistically reliable measures of their discrete facet of just sustainability. Here, the subscales' performance is briefly discussed.

Subscale J. Subscale J is grounded in the *justice and equity* construct described by Agyeman (2013). These items address the implications of privileged social identities in the environmental justice movement (Agyeman et al., 2002; Bullard, Gardezi, Chennault, & Dankbar, 2016). For example, items incorporate the history of environmental abuses targeting people of color, low income communities, and women (Chavis & Lee, 1987). This ten-item subscale mirrors the full JSAS in terms of the strong reliability of item separation ($Rel_{item} = .99,\ \chi^2(9) = 683.1, p < .05$) and the person separation coefficient ($\alpha = .80$) appears acceptable for use in low-stakes testing and program assessment.

Subscale Q. This subscale addresses *quality of life* in the context of environmental and social injustices; in Agyeman's paradigm (2015), justice requires more than basic clean air and water. This environmental framework argues for a global revision of standards of living to address environmental factors (e.g., clean air, water) and social factors (e.g., income inequality, occupational safety). The *quality of life* subscale demonstrated stronger reliability of persons ($Rel_{stu} = .83,\ \chi^2(296) = 1397.0, p < .05$) than subscales E and L in the subscale calibration, and the item separation ($Rel_{item} = .97,\ \chi^2(9) = 353.4, p < .05$) also indicates strong item discrimination when calibrated separately. Notably, however, the distribution of responses in subscale Q heavily favored the "agree" category (51% agree).

Subscale L. The *living within ecosystem limits* subscale includes items adapted from the New Ecological Paradigm Scale (Dunlap & Van Liere, 1978; Dunlap et al., 2000) as well as from the item bank published for student personnel administrators enacting sustainability programming (American College Personnel Association Sustainability Task Force, n.d.). These items mirror the conventional approach to environmentalism, which consider consumption (or conservation) of natural resources, resource scarcity, anthropocentrism, and climate science.

These items represent the environmental sustainability aspect of the Just Sustainability Paradigm. In the subscale calibration using the data collected for this study, reliability of separation for persons ($Rel_{stu} = .74,\ \chi^2(296) = 957.1, p < .05$) and items ($Rel_{item} = .99,\ \chi^2(9) = 1427.3, p < .05$) are within the limits established in this chapter. As discussed above, this subscale's item L8 continues to perform poorly despite the revisions made between pilot studies; the item wording "It is too late to do anything about climate change" appears to be interpreted inconsistently by test-takers, resulting in unpredictable responses and high misfit values (Infit mean square = 1.57, Outfit mean square = 1.73).

Subscale E. This element of Agyeman's Just Sustainability paradigm addresses equity for *present* and future generations in an attempt to remedy a limitation of other environmental paradigms (e.g., the New Ecological Paradigm) that focus on inter-generational equity without addressing the current generation's needs (Agyeman, 2013). The subscale addresses environmental issues the current generation faces. The Rasch model analysis findings indicate the subscale has moderate reliability in terms of separation of persons (interpreted as Cronbach's $\alpha = .75$; as with Subscale J, the reliability of items ($Rel_{item} = .97,\ \chi^2(9) = 1002.1, p < .05$) indicates that when calibrated as a distinct scale, these subscale items demonstrate meaningful separation and ordering. As discussed in the previous chapter, item E7 is the only subscale item whose Infit value (Infit mean square = 1.45) exceeds the specified range for rating scales (Bond & Fox, 2015; Linacre & Wright, 1994) when the subscale is calibrated independently.

In response to RQ3, it appears clear that the four subscales do in fact comprise statistically reliable measures of their respective facets of the Just Sustainability Paradigm. However, when possible researchers should consider using the entire 40-item scale to better reflect the complexity and intersectionality of this environmental paradigm; the 40-item scale

constitutes a more valid measure of attitudes toward *just sustainability* than any of the four subscales do independently.

Limitations

Despite the encouraging findings described above and in the previous chapter, it is important to articulate several noteworthy limitations in this study. The most significant challenge in conducting this study arose with the low response rates in every round of survey distributions. Despite the incentive to participate and the limited time necessary to complete the instrument, the response rate was far lower than the anticipated. The limited time and resources available precluded further incentivizing participation from the random samples collected from University of California at Davis, University of Vermont, and the University of Minnesota at Crookston, and Indiana State University; thus, additional recruitment emails were sent to the *University Leaders for a Sustainable Future* email list at University of Maryland, and undergraduate students from the University of Georgia Counseling & Human Development research pool. The latter two samples are non-random and may have contributed to the strong endorsement of the JSAS observed by the high rates of "agree" and "strongly agree" responses reported in the previous chapter, which somewhat exceed national norms as described above.

In addition to the low response rate, the sample was more homogenous with respect to several demographic factors than desirable. With respect to gender identity, 69% responded they were women, 29% indicated they were men, and fewer than 2% indicated transgender or non-binary identities. Of those who responded to the item, 97% indicated they were domestic students and 2% were international students. When asked about their religious affiliation, 48% claimed they were Christian (Catholic or Protestant), 29% were atheist or agnostic, and the remaining were distributed among Buddhist (1%), Hindu (1.5%), Jewish (5.3%), Muslim (1.4%)

and other (11.7%) or non-responses (1.8%). The overwhelming majority of respondents had the advantage of parents having attended a 2- or 4-year institution (80.1%). Most respondents were White (62%); the second highest percentage of respondents by race were Asian and Pacific Islander (8.2%), and multiracial or biracial (5.9%). Because the samples provided by the external gatekeepers do not include demographic data, it is not possible to compare the demographics of the students who completed the study with those who stopped out or did not enter. The overwhelming Whiteness of the sample may be indicative of the privilege associated with Whiteness being necessary for interest and action in the environmental movement, which is one of critiques of environmentalism that Agyeman advances in his Just Sustainability Paradigm (2013). As with any quantitative study, a higher response rate yielding a larger completed data set would provide more power for inferential statistics; however, given the focus of this study on item responses and the application of the Rasch rating scale model in instrument calibration, the small sample size limit the conclusions described in this chapter, and justify further testing of the instrument with larger and more diverse samples as suggested above.

Implications for Practice

In this study, the author sought to develop and report on the psychometric qualities of a measure of college students' attitudes toward environmental justice, using an environmental paradigm that more closely mirrored the values of social justice and equity embraced by college student personnel administrators across the United States. By situating the environmental justice and sustainability agenda in the social justice context, as Agyeman has done with his Just Sustainability Paradigm (2013), environmental justice issues can be understood to be directly linked to the social justice challenges around race, class, gender, and power and privilege broadly, that many student affairs professionals use to drive learning outcomes for the programs

and services they develop. To better assess and evaluate these programs, instruments like this *Just Sustainability Attitude Scale* may be used – either as the whole 40-item instrument, or a discrete subscale – as a starting point for developing learning objectives, but also as an instrument for measuring changes in attitudes after the intervention (i.e., using a pre/post experimental design). The items are worded clearly but access such broad concepts as racial and gender equity that they will map well to established learning outcomes for the types of educational programming that many student affairs administrators develop for undergraduate students; by assessing learning outcomes using the JSAS as a post-test, for example, programmers can incorporate the environmental justice elements of the JSAS in their pre-existing social justice intervention.

Beyond the specific intentions of the instrument for use in program assessment and evaluation, this instrument has potential use for research. As discussed in Chapter 3, college students' attitudes toward environmental sustainability and justice has not been a topic of discussion or research in student affairs literature and scholarship. The researcher's review of the most prominent academic journals in student affairs (*Journal of College Student Development* and the *Journal of Student Affairs Research and Practice*) yielded no articles reporting empirical research on students' knowledge or attitudes regarding environmental justice and sustainability.

As discussed in Chapter 3, the environmental paradigm advanced in this study embraces the intersection of social justice and sustainability, and echoes the critique of the prominence of Whiteness in the environmental movement. The movement has suffered because of the assumption that environmentalism is a White peoples' agenda; this perspective exists in part because of the socioeconomic privilege and cultural capital required to engage in activism

around environmental injustice. As with other aspects of social justice work (e.g., anti-racism activism) it is important for the individuals and communities with privilege to advocate for systemic change to correct injustice. In this case, the injustice of environmental degradation, pollution of natural resources, unequal access to environmental goods, and the imbalance in quality of life across and within generations are the crux of *just sustainability*. Current student affairs scholarship is largely focused on demographic factors influencing college access and student learning, and these factors follow from the same injustices described above. The environmental justice movement may appear tangential to many contemporary scholars, however student learning about these important topics is of immediate importance. Today's college students must understand and appreciate the intersectional nature of social and environmental justice. By incorporating these two agendas in future research on student learning and development, researchers may develop a better understanding of factors influencing student attitudes toward these important issues.

Future Research

Overall, the *Just Sustainability Attitude Scale* (JSAS) exhibits strong reliability coefficients and promises to meet the needs of researchers surveying students' attitudes toward environmental justice. Despite the strengths described here, the current JSAS would benefit from additional revision to address the limitations described in this chapter.

In Chapter 5, several items on the 40-item JSAS were identified based on their erratic responses and misfit values, as well as their relative difficulty on the logit scale and described as candidates for revision (e.g., items E6, E7, L8). To improve the instrument by revising these items, researchers may consider utilizing focus groups of undergraduate students to examine these items and develop alternative wording. Item L8 suffers from inconsistent interpretation by

respondents, leading to erratic responses. By revising these items and then re-testing the instrument using the Rasch rating scale model, these items' unexpected performance may be addressed. An alternative approach to revising existing items may be to drop those whose high misfit values or psychometric redundancy limit their usefulness in research and unnecessarily lengthen the instrument. By dropping these items from the instrument, the 40-item JSAS may be reduced to a short form (SF) instrument that can be completed in a shorter time frame and may be less intimidating to respondents who are not motivated to complete a web-based questionnaire.

Independent of additional revisions to the subscales and items, it is important to conduct additional testing of the instrument with larger and more diverse samples. Because the instrument is designed without a specific subset of college students intended, future researchers should consider testing the instrument performance with students from different parts of the country as well as different institutional types. Students attending HBCUs, faith-based, 2-year, and for-profit institutions are not represented in the sample used for this study and may demonstrate very different needs or educational goals (Renn & Reason, 2013); furthermore their institutions may not have the resources or institutional support to provide the type of co-curricular educational programming designed to promote environmental and social justice. The purpose of Rasch measurement models is to develop instruments that are invariant across samples, thus it is important to establish the JSAS remains invariant when the respondents comprise a more representative sample of the American college student.

Finally, the *just sustainability* construct itself warrants further exploration in the context of college students' learning and development processes. Because the construct ties social issues to environmental issues, it may be highly influenced by contextual factors like geographic

location (e.g., urban campuses versus regional campuses), institutional mission (e.g., Hispanic Serving Institutions or Historically Black Colleges and Universities) or student profiles (commuter and two-year campuses versus traditional four-year residential campuses). The environmental paradigm embraced in this study is relevant for environmental and social justice advocates, however its accessibility and immediate relevance to college students may differ based on these factors. Future researchers may benefit from further exploring whether other environmental paradigms (e.g., the New Ecological Paradigm, with its specific focus on strictly ecological issues) are more accessible and contribute more significantly to student learning in a student affairs context than the *just sustainability* paradigm used in this study (Agyeman, 2005, 2013).

Conclusion

Today's college students *must* be prepared to lead on issues of environmental and social justice. This need has never been clearer than today, when leaders in the United States government make daily decisions that imperil the rights and safety of refugees from war and famine, the safety and quality of our food, air, and water, and the hard-won gains for civil rights and social justice. By focusing on the nexus of race, class, gender, and environmental justice, this *Just Sustainability Attitude Scale* applies the *just sustainability paradigm* (Agyeman, 2013) to the development and calibration of a survey instrument designed to measure college students' attitudes toward just sustainability. This study demonstrated the psychometric qualities of the instrument, articulated the instrument's merits and applications, and described opportunities for future revision of the instrument, as well as future research opportunities using this environmental paradigm. By embracing this framework for justice and applying it to assessment, evaluation, and research (American College Personnel Association & National

Association for Student Personnel Administrators, 2015) in student affairs in higher education, scholars and practitioners may continue to advance student learning about the critical issues of environmental and social justice that they will face in the very near future.

References

Agyeman, J. (2005). *Sustainable communities and the challenge of environmental justice*. New York, NY: New York University Press.

Agyeman, J. (2013). *Introducing Just Sustainabilities: Policy, planning, and practice*. London, UK: Zed Books.

Agyeman, J., Bullard, R. D., & Evans, B. (2002). Exploring the nexus: Bringing together sustainability, environmental justice, and equity. *Space & Polity, 6*(1), 77-90.

Agyeman, J., & Crouch, C. (2004). The contribution of environmental justice to sustainability in higher education. In P. B. Corcoran & A. E. J. Wals (Eds.), *Higher education and the challenge of sustainability: Problematics, promise, and practice* (pp. 113-130). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Amburgey, J., & Thoman, D. (2012). Dimensionality of the New Ecological Paradigm: Issues of factor structure and measurement. *Environment and Behavior, 44*(2), 235-256. doi:10.1177/0013916511402064

American Association for Higher Education, American College Personnel Association, & National Association for Student Personnel Administrators. (1998). *Powerful partnerships: A shared responsibility for learning*. Washington, DC: Author.

American College Personnel Association. (1994). *The student learning imperative*. Washington, DC: Author.

American College Personnel Association, & National Association for Student Personnel Administrators. (1997/1999). *Principles of good practice for student affairs*. Washington, DC: Author.

American College Personnel Association, & National Association for Student Personnel Administrators. (2004). *Learning reconsidered: A campus-wide focus on the student experience*. Washington, DC: Author.

American College Personnel Association, & National Association for Student Personnel Administrators. (2010). *Professional competency areas for student affairs practitioners*. Washington, DC: Author.

American College Personnel Association, & National Association for Student Personnel Administrators. (2015). *Professional competency areas for student affairs educators*. Washington, DC: Author.

American College Personnel Association Sustainability Task Force. (n.d.). *Student learning outcomes assessment materials guidebook*. Washington, DC: Author.

American Council on Education. (1937). *The student personnel point of view* (Vol. 1). Washington, DC: Author.

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: Author.

Andrich, D. (1978). A rating formulation for ordered response categories. *Psychometrika, 43*(4), 561-573.

Andrich, D. (2004). Controversy and the Rasch Model: A characteristic of incompatible paradigms? *Medical Care, 42*(1), I7-I16.

Bell, L. A. (2007). Theoretical Foundations for Social Justice Education. In M. Adams, L. A. Bell, & P. Griffin (Eds.), *Teaching for diversity and social justice* (2nd ed., pp. 1-14). New York, NY: Routledge.

Bond, T. F., & Fox, C. M. (2015). *Applying the Rasch model: Fundamental measurement in the human sciences* (3rd ed.). New York, NY: Routledge.

Brainard, L., Jones, A., & Purvis, N. E. (2009). Introduction. In L. Brainard, A. Jones, & N. E. Purvis (Eds.), *Climate change and global poverty: A billion lives in the balance?* . Washington, DC: Brookings Institution Press.

Buckley, J. (2015). "Constantly in the Making": Pedagogical characteristics of Education for Sustainability in postsecondary classrooms. *Journal of College & Character, 16*(1), 9-21. doi:10.1080/2194587X.2015.1008275

Bullard, R. (1990). *Dumping in Dixie: Race, class, and environmental quality* (3rd ed.). Boulder, CO: Westview.

Bullard, R., Gardezi, M., Chennault, C., & Dankbar, H. (2016). Climate change and environmental justice: A conversation with Dr. Robert Bullard. *Journal of Critical Thought and Praxis, 5*(2), 1-5.

Campbell, S. K., Wright, B., & Linacre, J. M. (2002). Development of a functional movement scale for infants. *Journal of Applied Measurement, 3*(2), 190-204.

Carson, R. (1962). *Silent spring*. Boston, MA: Houghton Mifflin.

Catton, W., & Dunlap, R. (1978). Environmental sociology: A new paradigm. *The American Sociologist, 78*(1), 41-49.

Chavis, B., & Lee, C. (1987). *Toxic wastes and race in the United States: A national report on the racial and socio-economic characteristics of communities with hazardous waste sites*. New York, NY: United Church of Christ Commission for Racial Justice.

Chickering, A. W., & Braskamp, L. A. (2009). Developing a global perspective for personal and social responsibility. *Peer Review, 11*, 27-30.

Cortese, A. (2003). The critical role of higher education in creating a sustainable future. *Planning for Higher Education, 31*(3), 15-22.

Cortese, A. (2012). Promises made and promises lost: A candid assessment of higher education leadership and the sustainability agenda. In J. Marin & J. E. Samels (Eds.), *The sustainable university* (pp. 17-32). Baltimore, MD: Johns Hopkins University.

Cortese, A. D. (2003). The critical role of higher education in creating a sustainable future. *Planning for Higher Education, 31*(3), 15-22.

Cortese, A. D. (2012). Promises made and promises lost: A candid assessment of higher education leadership and the sustainability agenda. In J. Marin & J. E. Samels (Eds.), *The sustainable university* (pp. 17-32). Baltimore, MD: Johns Hopkins University.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and application. *Journal of Applied Psychology, 78*(1), 98-104.

Council for the Advancement of Standards in Higher Education. (2012). *CAS professional standards for higher education* (8th ed.). Washington, DC: Author.

Creamer, D., Winston, R. B., & Miller, T. K. (2001). The professional student affairs administrator: Roles and functions. In R. B. Winston, D. Creamer, & T. K. Miller (Eds.), *The professional student affairs administrator: Educator, leader, and manager* (pp. 3-38). New York, NY: Routledge.

Creswell, J. W. (2014). *Reserach design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.

Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. Belmont, CA: Wadsworth Group.

Deutz, P. (2014). A class-based analysis of sustainable development: Developing a radical perspective on environmental justice. *Sustainable Development, 22*, 243-252. doi:10:1002/sd.1528

Dobson, A. (2003). Social Justice and Environmental Sustainability: Ne'er the Twain Shall Meet? In J. Agyeman, R. D. Bullard, & B. Evans (Eds.), *Just sustainabilities: Development in an unequal world* (pp. 83-99). Cambridge, MA: The MIT Press.

Dugan, J. P. (2013). Patterns in group invovlement experiences during college: Identifying a taxonomy. *Journal of College Student Development, 54*(3), 229-246. doi:10.1353/csd.2013.0028

Dunlap, R., & Catton, W. (1979). Environmental Sociology. *Annual Review of Sociology, 5*, 243-273.

Dunlap, R., & Van Liere, K. (1978). The "New Environmental Paradigm". *The Journal of Environmental Education, 9*(4), 10-19.

Dunlap, R., Van Liere, K., Mertig, A., & Jones, R. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues, 56*(3), 425-442.

Dunn, M., & Hart-Steffes, J. (2012). Sustainability as moral action. In D. L. Liddell & D. L. Cooper (Eds.), *Facilitating the moral growth of college students, (New Directions for Student Services No. 139, pp. 73-83).* San Francisco, CA: Jossey-Bass.

Eagan, K., Stolzenberg, E. B., Bates, A. K., Aragon, M. C., Suchard, M. R., & Rios-Aguilar, C. (2015). *The American freshman: National norms fall 2015*. Los Angeles, CA: Higher Education Research Institute, UCLA.

Eagan, K., Stolzenberg, E. B., Ramirez, J. J., Aragon, M. C., Suchard, M. R., & Hurtado, S. (2014). *The American freshman: National norms fall 2014*. Los Angeles, CA: Higher Education Research Institute, UCLA.

Eagan, K., Stolzenberg, E. B., Ramirez, J. J., Aragon, M. C., Suchard, M. R., & Rios-Aguilar, C. (2016). *The American freshman: Fifty-Year trends, 1966-2015*. Los Angeles, CA: Higher Education Research Institute, UCLA.

Edwards, K. (2012) Moving beyond green: Sustainable development toward healthy environments, social justice, and strong economies. In B. A. Jacobs & J. Kinzie (Series Ed.), *New Directions for Student Services, No. 137. Enacting sustainability campuswide* (pp. 19-28). San Francisco, CA: Wiley Periodicals.

Elkington, J. (1999). *Cannibals with forks: The triple bottom line of 21st century business*. Oxford, United Kingdom: Capstone Publishing Limited.

Engelhard, G. (2013). *Invariant measurement: Using Rasch models in the social, behavioral, and health sciences*. New York, NY: Routledge.

Faber, D. R., & McCarthy, D. (2003). Neo-Liberalism, Globalization and the Struggle for Ecological Democracy: Linking Sustainability and Environmental Justice. In J. Agyeman, R. D. Bullard, & B. Evans (Eds.), *Just sustainabilities: Development in an unequal world* (pp. 38-64). Cambridge, MA: The MIT Press.

General Accounting Office. (1983). *Siting of hazardous waste landfills and their correlation with racial and economic status of surrounding communities*. Washington, DC: GPO.

Georgia Initiative for Climate and Society. (n.d.). About the initiative: Objectives. Retrieved from http://climateandsociety.ovpr.uga.edu/about-the-initiative/objectives/

Gilligan, C. (1977). In a different voice: Women's conceptions of self and morality. *Harvard Educational Review, 47*, 481-517.

Goldman, B., & Fitton, L. (1994). *Toxic waste and Race revisited: An update of the 1987 report on the racial and socio-economic characteristics of communities with hazardous waste sites.* New York, NY: United Church of Christ Commission for Racial Justice.

Hambleton, R. K., & Jones, R. W. (1993). Comparison of Classical Test Theory and Item Response Theory and their applications to test development. *Educational Measurement: Issues and Practice, Fall*, 38-47.

Hardiman, R., Jackson, B., & Griffin, P. (2007). Conceptual Foundations for Social Justice Education. In M. Adams, L. A. Bell, & P. Griffin (Eds.), *Teaching for diversity and social justice* (2nd ed., pp. 35-66). New York, NY: Routledge.

Harraway, J., Broughton-Ansin, F., Deaker, L., Jowett, T., & Shephard, K. (2012). Exploring the use of the Revised New Ecological Paradigm Scale (NEP) to monitor the development of students' ecological worldviews. *The Journal of Environmental Education, 43*(3), 177-191. doi:10.1080/00958964.2011.634450

Hattie, J., Jaeger, R. M., & Bond, L. (1999). Persistent methodological questions in educational testing. *Review of Research in Education, 24*, 393-446.

Hawcroft, L., & Milfont, T. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology, 30*, 143-158. doi:10.1016/j.jenvp.2009.10.003

Holifield, R. (2001). Defining Environmental Justice and Environmental Racism. *Urban Geography, 22*(1), 78-90. doi:10.2747/0272-3638.22.1.78

Intergovernmental Panel on Climate Change. (2013). *Summary for policymakers: Climate change 2013 - the phyiscal science basis*. Retrieved from https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WGIAR5_SPM_brochure_en.pdf

International Association of Universities, United Nations University, & Association of Universities and Colleges Canada. (1991). *The Halifax Declaration: Creating a Common Future* Retrieved from http://www.iisd.org/educate/declarat/backgrou.htm

International Conference on Higher Education for Sustainable Development. (2015). *Nagoya Declaration on Higher Education for Sustainable Development*. Nagoya, Japan Retrieved from http://www.c-linkage.com/for/hesd/declaration.html.

Jones, L. V., & Thissen, D. (2007). A history and overview of psychometrics. . In C. R. Rao & S. Sinharay (Eds.), *Handbook of Statistics: Psychometrics* (Vol. 26, pp. 1-28). Amsterdam: Elsevier.

Kerr, K., & Hart-Steffes, J. (2012). Sustainability, student affairs, and students. In B. A. Jacobs & J. Kinzie (Eds.), *Enhancing sustainability campuswide (New Directions for Student Services No. 137, pp. 7-18)*. San Francisco, CA: Jossey-Bass.

Kohlberg, L. (1984). Moral stages and moralization: The cognitive-developmental approach. In L. Kohlberg (Ed.), *The psychology of moral development: The nature and validity of moral stages* (Vol. 2, pp. 170-205). San Francisco, CA: Harper Row.

Linacre, J. M. (1999). Investigating rating scale category utility. *Journal of Outcome Measurement, 3*(2), 103-122.

Linacre, J. M. (2002). Understanding Rasch measurement: Optimizing rating scale category effectiveness. *Journal of Applied Measurement, 3*(1), 85-106.

Linacre, J. M. (2012). *Many-Faceted Rasch measurement: FACETS tutorial* Retrieved from www.winsteps.com

Linacre, J. M. (2013). *A user's guide to FACETS Rasch-Model computer programs Program Manual 3.71.0* Retrieved from www.winsteps.com

Linacre, J. M., & Wright, B. (1994). Reasonble mean-square fit values. *Rasch Measurement Transactions, 8*(3), 370.

Loehlin, J. C. (2011). *Latent variable models: An introduction to factor, path, and structural equation analysis* (4th ed.). New York, NY: Routledge.

Malazczuk, P. (1995). Sustainable development: Some critical thoughts on the Rio Conference. In K. Ginther, E. Denters, & P. J. I. M. d. Waart (Eds.), *Sustainable development and good governance* (pp. 23-49). Dordrech, The Netherlands: Martinus Nijhoff Publishers.

Messick, S. (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American Psychologist, 50*(9), 741-749.

Morales, A. (2011). Growing food and justice: Dismantling racism through sustainable food systems. In A. H. Alkon & J. Agyeman (Eds.), *Cultivating food justice: Race, class, and sustainability* (pp. 149-176). Cambridge, MA: The MIT Press.

Multi-Institutional Study of Leadership. (2015). About MSL. Retrieved from http://leadershipstudy.net/about/

National Task Force on Civic Learning and Democratic Engagement. (2012). *A crucible moment: College learning and democracy's future*. Washington, DC: Association of American Colleges and Universities.

Nyong, A. (2009). Climate change impacts in the developing world: Implications for sustainable development. In L. Brainard, A. Jones, & N. E. Purvis (Eds.), *Climate change and global poverty: A billion lives in the balance?* (pp. 43-64). Washington, DC: Brookings Institution Press.

Pienaar, E. F., Lew, D. K., & Wallmo, K. (2013). Are environmental attitudes influenced by survey context? An investigation of the context dependency of the New Ecological Paradigm (NEP) scale. *Social Science Research, 42*, 1542-1554. doi:10.1016/j.ssresearch.2013.07.001

Pulido, L. (1996). A critical review of the methodology of environmental racism research. *Antipode, 28*(2), 142-159.

Reckase, M. (1979). Unifactor latent trait models applied to multifactor tests: Results and implications. *Journal of Educational Statistics, 4*(3), 207-230.

Reise, S. P., Widaman, K. F., & Pugh, R. H. (1993). Confirmatory Factor Analysis and Item Response Theory: Two approaches for exploring measurement invariance. *Psychological Bulletin, 114*(3), 559-566.

Renn, K. A., & Reason, R. D. (2013). *College students in the United States: Characteristics, experiences, and outcomes*. San Francisco, CA: Jossey-Bass.

Roberts, P. (2003). Sustainable development and social justice: Spatial priorities and mechanisms for delivery. *Sociological Inquiry, 73*(2), 228-244.

Roque, J. A. (1993). Environmental equity: Reducing risk for all communities. *Environment, 35*(5), 25-28.

Rowe, D., & Johnston, L. F. (2013). Learning outcomes: An international comparison of countries and declarations. In L. F. Johnston (Ed.), *Higher education for sustainability:*

Cases challenges, and opportunities from across the curriculum (pp. 45-61). New York, NY: Routledge.

Savageau, A. E. (2013). Let's get personal: Making sustainability tangible to students. *International Journal of Sustainability in Higher Education, 14*(1), 15-24.

Schlosberg, D. (2007). Reconceiving environmental justice: Global movements and political theories. *Environmental Politics, 13*(3), 517-540. doi:10.1080/0964401042000229025

Sterling, S. (2004). Higher education, sustainability, and the role of systemic learning. In P. B. Corcoran & A. E. J. Wals (Eds.), *Higher education and the challenge of sustainability: Problematics, promise and practice* (pp. 49-70). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Stevens, S. S. (1946). On the theory of scales of measurement. *Science, 103*(2684), 677-680.

Sustainability Literacy Test. (2014a). About the test. Retrieved from http://www.sulite.org/en/faq

Sustainability Literacy Test. (2014b). *The Sustainability Literacy Test: One year report*. Nagoya, Japan.

Svanstrom, M., Lozano-Garcìa, F. J., & Rowe, D. (2008). Learning outcomes for sustainable development in higher education. *International Journal of Sustainability in Higher Education, 9*(3), 339-351. doi:10.1108/14676370810885925

Swilling, M., & Annecke, E. (2012). *Just transitions: Explorations of sustainability in an unfair world*. Tokyo, Japan: United Nations University Press.

Tarrant, M. A., & Lyons, K. (2012). The effect of short-term educational travel programs on environmental citizenship. *Environmental Education Research, 18*(3), 403-416.

Tarrant, M. A., Rubin, D. L., & Stoner, L. (2013). The added value of study abroad: Fostering a global citizenry. *Journal of Studies in International Education, 20*(10), 1-21. doi:10.1177/1028315313497589

Taylor, D. (2000). The rise of the Environmental Justice Paradigm: Injustice framing and the social construction of environmental discourses. *American Behavioral Scientist, 43*(4), 508-580.

Taylor, D. E. (2000). The rise of the Environmental Justice Paradigm: Injustice framing and the social construction of environmental discourses. *American Behavioral Scientist, 43*(4), 508-580.

Thorndike, R. M. (2005). *Measurement and evaluation in psychology and education* (7th ed.). Upper Saddle River, NJ: Pearson

United Nations Council on Economic Development. (1992). *Promoting education and public awareness and training*. Retrieved from http://www.un-documents.net/a21-36.htm

United Nations Division for Sustainable Development. (2015a). Higher education for Sustainable Development. Retrieved from https://sustainabledevelopment.un.org/sdinaction/hesi

United Nations Division for Sustainable Development. (2015b). Sustainable Development knowledge platform. Retrieved from https://sustainabledevelopment.un.org/

United Nations Millennium Ecosystem Assessment Board. (2005). *Millennium ecosystem assessment: Ecosystems and human wellbeing*. New York, NY: United Nations.

United Nations World Commission on Environment and Development. (1987). *Our common future*. Oxford, United Kingdom: United Nations.

University Presidents for a Sustainable Future. (1990). *The Talloires Declaration*. Talloires, France: Author.

Upcraft, M. L., & Schuh, J. H. (1996). *Assessment in student affairs: A guide for practitioners*. San Francisco, CA: Jossey-Bass.

Van Weelie, D., & Wals, A. E. J. (2002). Making biodiversity meaningful through environmental education. *International Journal of Science Education, 24*(11), 1143-1156. doi:10.1080/09500690210134839

Wals, A. E. J., & Corcoran, P. B. (2004). The problematics of sustainability in higher education: A synthesis. In P. B. Corcoran & A. E. J. Wals (Eds.), *Higher education and the challenge of sustainability: Problematics, promise, and practice* (pp. 87-88). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Watson, L., Johnson, C., Hegtvedt, K. A., & Parris, C. L. (2015). Living green: Examining sustainable dorms and identities. *International Journal of Sustainability in Higher Education, 16*(3), 310-326.

Wells, A. M. (2014). Developing faculty-staff collaborations to foster a culture of environmental justice. *Georgia Journal of College Student Affairs, Fall*, 68-79.

Wilson, M. (2005). *Constructing measures: An item response modeling approach*. Mahwah, NJ: Lawrence Erlbaum Associates.

Wirth, R. J., & Edwards, M. C. (2007). Item Factor Analysis: Current approaches and future directions. *Psychological Methods, 12*(1), 58-79.

Wolfe, C. (2010). *What is Posthumanism?* Minneapolis, MN: University of Minnesota Press.

Wright, B. (1997). A history of social science measurement. *Educational Measurement: Issues and Practice, 52*, 33-45.

Wright, T. S. A. (2002). Definitions and frameworks for environmental sustainability in higher education. *Higher Education Policy, 15*(2), 105-120.

APPENDIX A

Items and Performance Characteristics

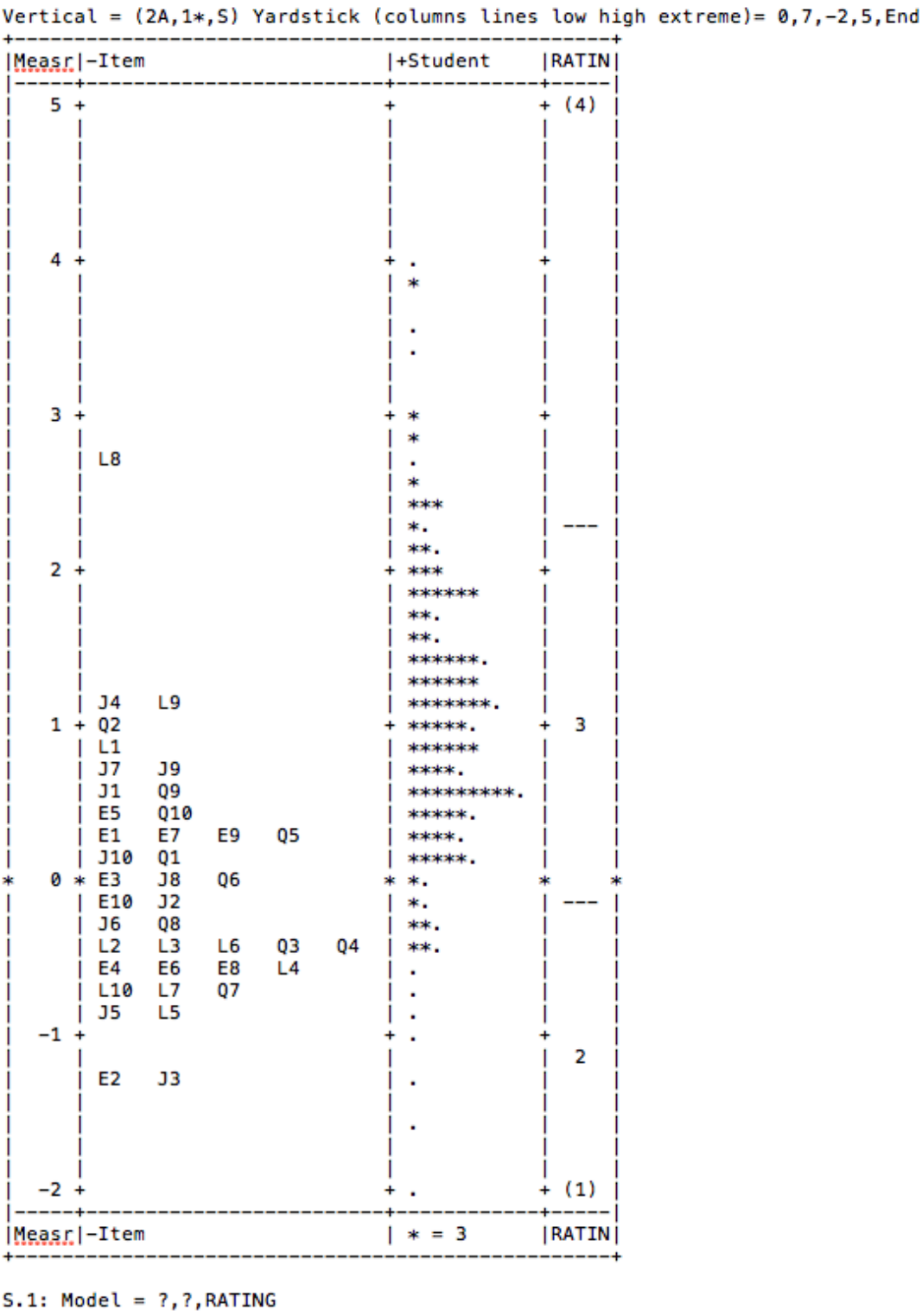
Item	Item Language	Measure	Model S.E.	Infit MnSq	Outfit MnSq	Discrim	PtBs Corr
E1	Government regulations on corporations benefit all of us.	**0.30**	0.09	1.07	1.11	0.91	0.45
E10	Today's environmental regulations can address previous generations' environmental abuses.	**-0.19**	0.09	1.06	1.12	0.93	0.4
E2	Ecological justice is important for my generation as well as future generations.	**-1.31**	0.11	0.71	0.69	1.38	0.64
E3	The world would be a better place if people in the United States stopped consuming more than their fair share of resources.	**-0.03**	0.09	0.92	0.93	1.11	0.63
E4	Developed nations like the United States must make urgent and drastic choices for the good of the planet.	**-0.59**	0.1	0.72	0.73	1.36	0.65
E5	Wealthy consumers are unaware of the effects of their consumption.	**0.46**	0.09	1.29	1.3	0.65	0.39
E6	Local problems (like poverty and nutrition) are as important as global climate change.	**-0.5**	0.09	1.46	1.54	0.46	0.32
E7	Environmental activists must resolve local environmental issues before worrying about other countries' problems.	**0.31**	0.09	1.5	1.6	0.32	-0.04
E8	Wealthy countries must help protect the environment by supporting environmentally sustainable development in poorer counties.	**-0.55**	0.09	0.76	0.76	1.29	0.56
E9	Ecological justice includes addressing socioeconomic class inequality.	**0.28**	0.09	0.74	0.74	1.32	0.64
J1	Racism influences where corporations and governments engage in environmental abuses.	**0.64**	0.09	0.9	0.91	1.13	0.61
J10	The wealthiest 1% are financially insulated from the	**0.08**	0.09	1.26	1.25	0.72	0.5

	effects of environmental injustice.						
J2	Poverty is a global problem with local solutions.	**-0.14**	0.09	0.93	0.94	1.08	0.41
J3	The involvement of the local community is necessary for the success of ecological justice.	**-1.28**	0.1	0.81	0.89	1.19	0.45
J4	Poverty in the United States is related to the quality of the environment here.	**1.1**	0.08	0.95	0.95	1.05	0.4
J5	Volunteering in my community can promote ecological justice.	**-0.89**	0.1	0.68	0.71	1.32	0.4
J6	Environmental abuses disproportionately affect low-income communities.	**-0.24**	0.09	0.78	0.78	1.28	0.64
J7	Universities should require all students, regardless of major, to learn about ecological justice.	**0.75**	0.09	0.97	1.01	1	0.48
J8	Environmental issues are moral issues.	**-0.06**	0.09	0.9	0.91	1.13	0.52
J9	Ecological justice cannot be achieved without dramatic changes to reduce income inequality.	**0.7**	0.09	0.94	0.94	1.08	0.55
L1	People should be punished for environmentally unsustainable behavior.	**0.82**	0.09	0.97	0.98	1.04	0.44
L10	Europe and North America consume more than their fair share of the world's resources.	**-0.67**	0.1	0.99	0.95	1.07	0.63
L2	Modern human activity has done permanent, irreversible harm to the planet.	**-0.38**	0.09	1.23	1.34	0.71	0.33
L3	Plants and animals have as much right as humans to exist.	**-0.43**	0.09	1.4	1.4	0.57	0.42
L4	If things continue their present course, we will soon experience a major ecological catastrophe.	**-0.59**	0.1	0.94	0.94	1.11	0.61
L5	Despite our special abilities humans are still subject to the laws of nature.	**-0.92**	0.1	0.8	0.79	1.24	0.49
L6	The earth is like a spaceship with very limited room and resources.	**-0.41**	0.1	1.04	1.07	0.97	0.49
L7	The balance of humans and nature is very delicate.	**-0.7**	0.1	0.84	0.91	1.18	0.45
L8	It is too late to do anything about climate change.	**2.78**	0.1	1.61	1.85	-0.04	-0.21

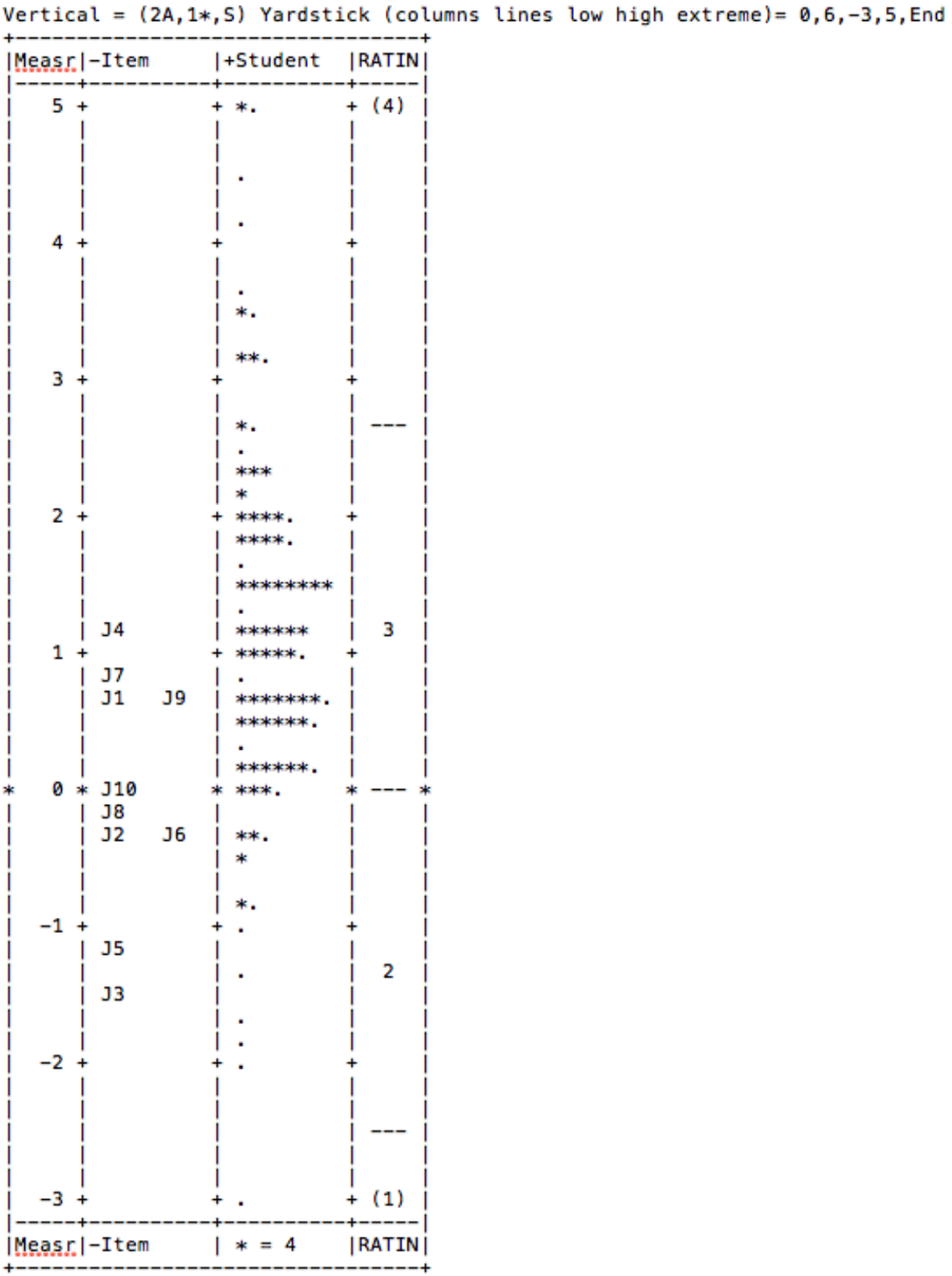
L9	Universities should not offer housing, dining, or other services that are not completely environmentally sustainable.	**1.07**	0.08	1.07	1.08	0.89	0.41
Q1	The United States government should fight poverty in the developing world.	**0.09**	0.09	0.96	0.95	1.06	0.48
Q10	Income inequality leads to an overall lower quality of life for everybody.	**0.41**	0.09	1.15	1.14	0.85	0.56
Q2	Women's rights must be addressed in order to advance ecological justice.	**1.01**	0.09	0.95	0.96	1.07	0.56
Q3	I am willing to make small sacrifices (e.g., walk/bike instead of drive) in the interest of ecological justice.	**-0.44**	0.1	0.95	0.99	1.08	0.49
Q4	Reducing poverty is important for a healthy environment around the world.	**-0.38**	0.1	0.71	0.74	1.34	0.52
Q5	Our current standard of living in the United States is too extreme to be ecologically just.	**0.31**	0.09	0.96	0.99	1.06	0.57
Q6	Concentration of wealth in the top 1% threatens justice in our society.	**0.00**	0.09	1.09	1.07	0.93	0.61
Q7	Access to locally-produced foods promotes economic and environmental justice.	**-0.69**	0.1	0.73	0.75	1.32	0.51
Q8	Public parks and gardens in low-income communities contribute to environmental justice	**-0.3**	0.09	0.8	0.78	1.26	0.52
Q9	Racism is a threat to environmental justice.	**0.59**	0.09	1.16	1.16	0.84	0.56

APPENDIX B

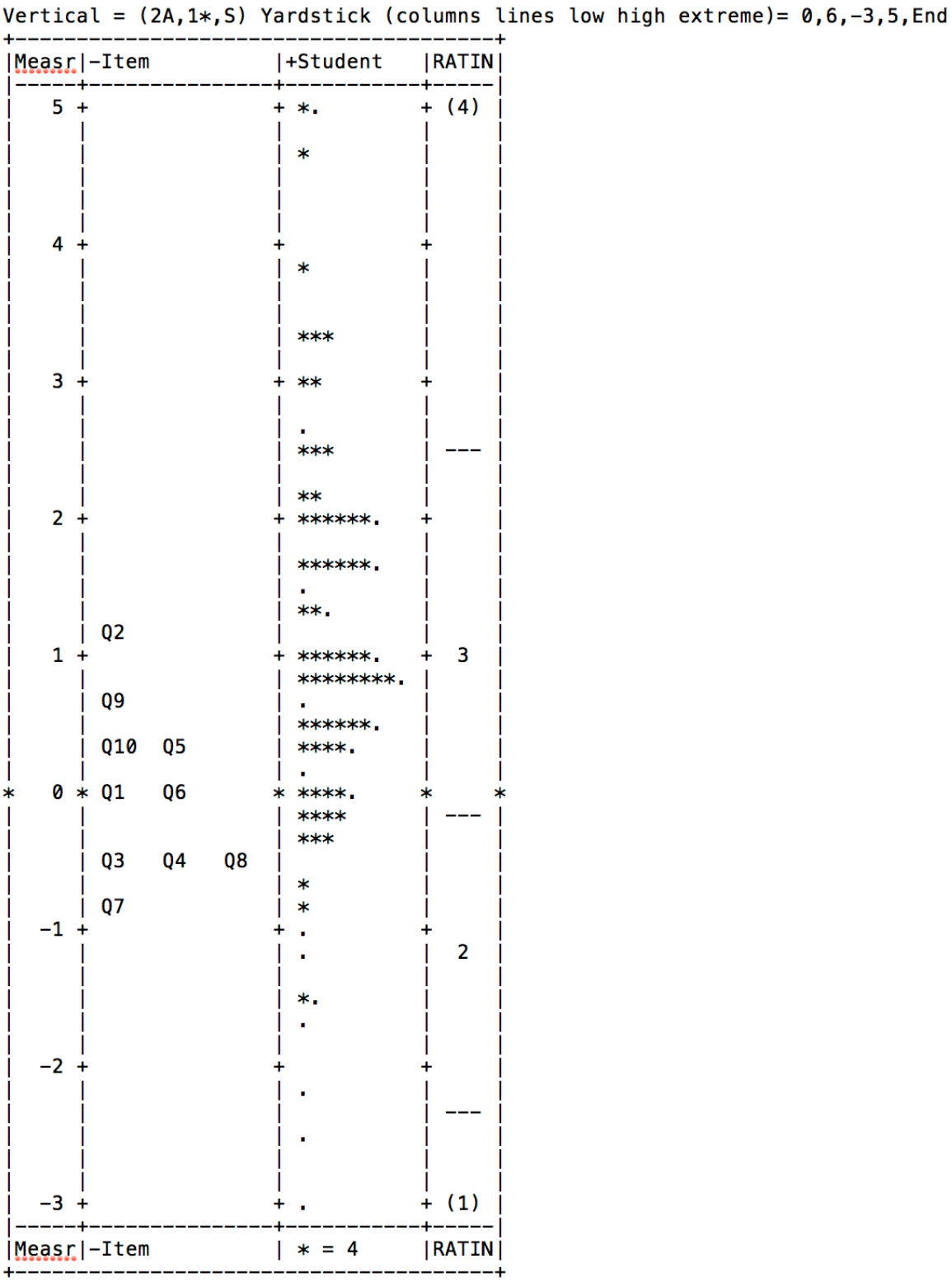
Full 40-item JSAS Wright Map



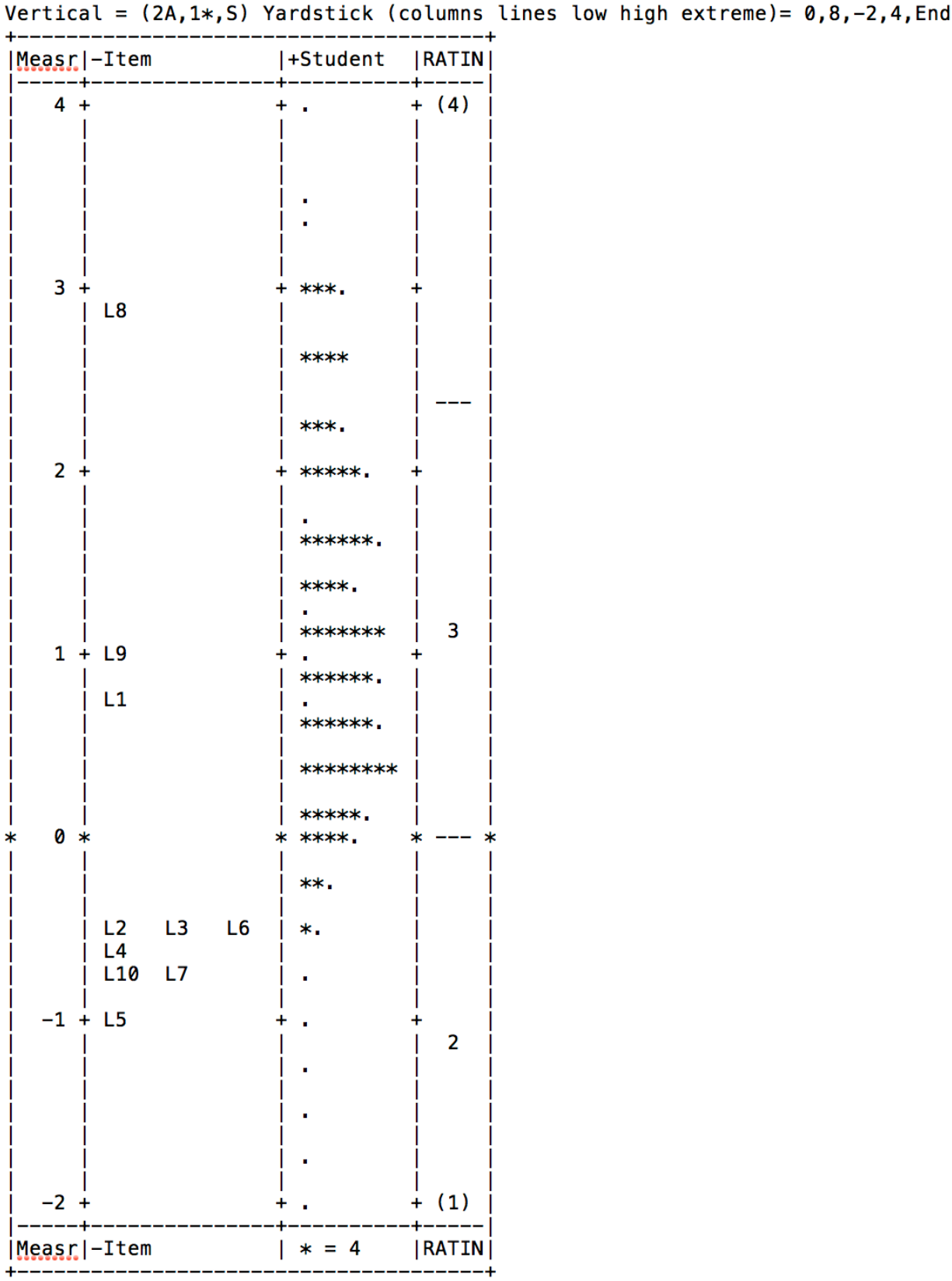
Subscale J Wright Map



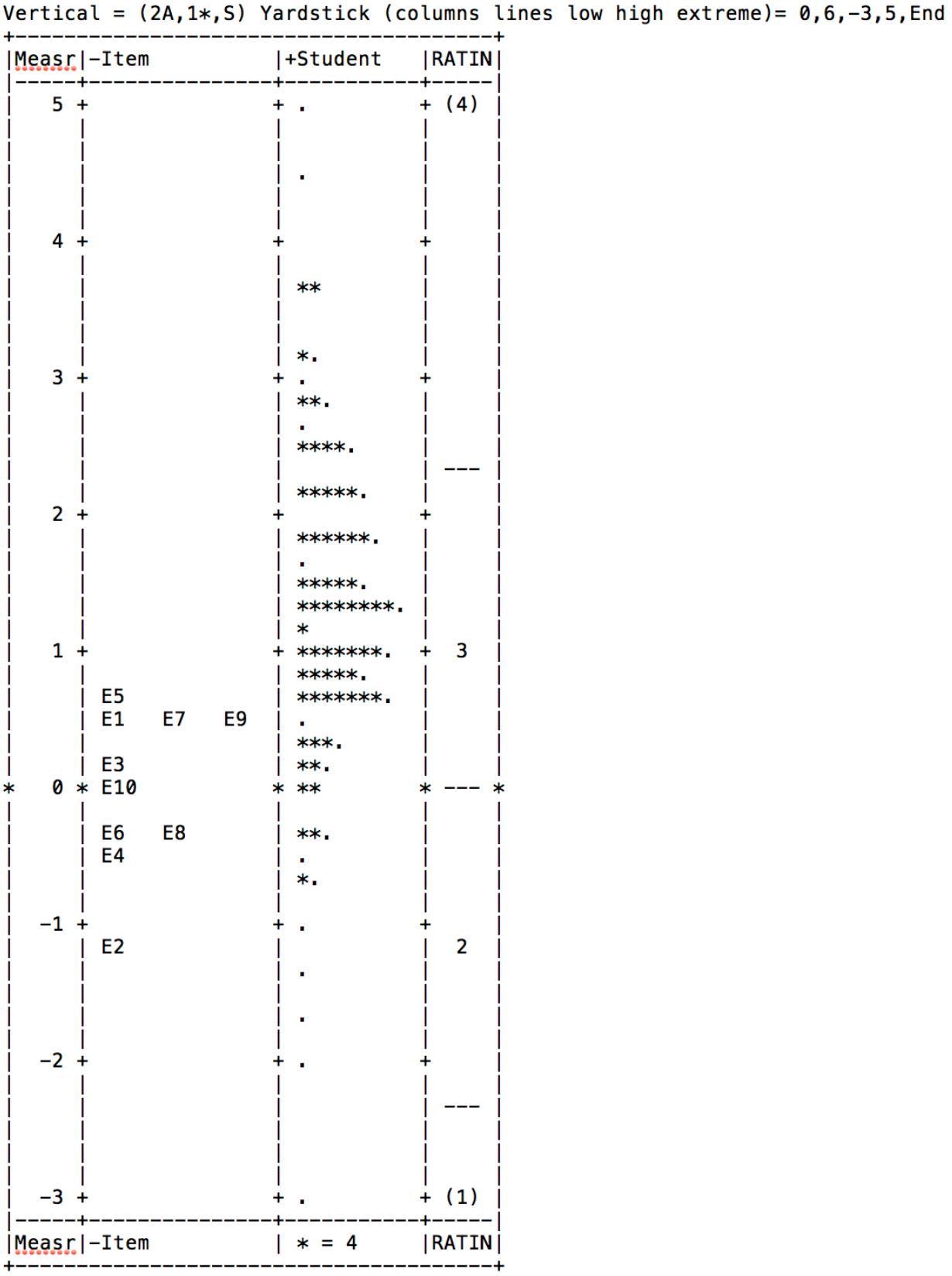
Subscale Q Wright Map



Subscale L Wright Map



Subscale E Wright Map



Appendix C

Facets Program

```
Jan5 Full JSAS Data
Title = JSAS Full Data set Fall 2016;
Arrange = F, m                    ;
Facets = 2                        ;
Pt-biserial = Y                   ;
DValue = 2, 1-40                  ;
Model = ?, ?, rating              ;
Vertical = 2A, 1*                 ;
Rating scale = rating, R4         ;
1 = Strong Disagree               ;
2 = Disagree                      ;
3 = Agree                         ;
4 = Strong Agree                  ;
*
Labels =
1, Student
1-299
*

2, Item
1 = J3
2 = J7
3 = E8
4 = J4
5 = E6
6 = E10
7 = L10
8 = J10
9 = L3
10 = Q5
11 = J9
12 = Q2
13 = J5
14 = Q1
15 = Q10
16 = E9
17 = Q9
18 = L2
19 = E1
20 = L9
21 = J8
22 = E7
```

23 = L8
24 = Q4
25 = E4
26 = L7
27 = L4
28 = J2
29 = Q8
30 = Q3
31 = Q7
32 = E2
33 = J6
34 = E3
35 = J1
36 = E5
37 = L1
38 = Q6
39 = L5
40 = L6
*
data = Jan5Run.csv
*

APPENDIX D

Questionnaire Demographic Items

Q14 Please indicate your year in college. If you transferred from a community college or a different college/university from the one you attend now, include the years you studied at that previous institution.

- ❍ 1st year student (or freshman) (1)
- ❍ 2nd year student (2)
- ❍ 3rd year student (3)
- ❍ 4th year student (4)
- ❍ 5th year student (5)
- ❍ after 5th year (6)
- ❍ Graduate/Professional student (7)

Q15 Please indicate which term best reflects your gender identity:

- ❍ Man (1)
- ❍ Trans* or Gender-queer (2)
- ❍ Woman (3)

Q16 How old are you?

- ❍ 18 (1)
- ❍ 19 (2)
- ❍ 20 (3)
- ❍ 21 (4)
- ❍ 22 (5)
- ❍ 23 (6)
- ❍ 24 (7)

Q17 Please indicate the racial identity or identities with which you most closely identify:

- ❑ Black and African-American (1)
- ❑ Asian and Pacific Islander (2)
- ❑ Caucasian and European-American (3)
- ❑ Hispanic or Latino (4)
- ❑ Middle-Eastern (5)
- ❑ Native American and Alaskan Native (6)
- ❑ Multiracial (7)
- ❑ My ethnicity is not reflected by these options (8)
- ❑ Choose not to respond (9)

Q18 Are you considered an international student?

- ❍ Yes (1)
- ❍ No (2)

Q19 Which of the following best represents your current religions/spiritual practice:

- ❍ Atheist (1)
- ❍ Agnostic (2)
- ❍ Buddhist (3)
- ❍ Christian – Catholic (4)
- ❍ Christian – Protestant (5)
- ❍ Hindu (6)
- ❍ Jewish (7)
- ❍ Muslim (8)
- ❍ Other (9)

Q20 Did any of your parents/guardians complete a 2- or 4-year degree?

- ❍ Yes (1)
- ❍ No (2)

Q21 Please indicate the area of study that best reflects your intended major. If you are double-majoring, please choose only one option:

- ❍ Liberal Arts (e.g., English, Foreign Languages, Music, Art, and Art History) (1)
- ❍ Social Sciences (e.g., Political Science, Sociology, Psychology) (2)
- ❍ Business and Economics (3)
- ❍ Physical Sciences (e.g., Biology, Chemistry, Physics) (4)
- ❍ Technology, Engineering, and Math (5)

APPENDIX E

Informed Consent Page

Dear student:
I am a doctoral candidate in the Counseling and Student Personnel Services program conducting dissertation research under the supervision of Dr. Diane Cooper at the University of Georgia. I invite you to participate in a research study to understand students' attitudes toward environmental justice.

The purpose of this study is to test the validity of a questionnaire I am developing that is designed to measure attitudes toward environmental justice. You must be between the ages of 18 and 24 to participate.

Your participation will involve responding to an electronic questionnaire about your attitudes and opinions as they are related to environmental justice. The questionnaire should take no more than 30 minutes to complete. Your involvement in the study is completely voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are otherwise entitled. Once submitted, there will be no way to identify your responses and thus the researcher will be unable to redact them from the data set.

There are no known risks or discomforts associated with this research, but you may discontinue your involvement in this research study any time prior to submitting your responses on the online questionnaire. You may also choose to skip any question you are not comfortable answering.

The questionnaire does not ask for any individually identifiable information on the data received by the researchers from the online host, and the responses will not include your IP address. Please note that Internet communications can be insecure and there is a limit to the confidentiality that can be guaranteed due to technology itself. If you are not comfortable with the level of confidentiality provided by the internet, please feel free to print out a copy of the questionnaire, fill it out by hand, and mail it to Andrew Wells, 413-D Aderhold Hall, 110 Carlton Street, Athens, GA 30605 with no return address on the envelope. The results of the research study may be published and published results will only be presented in summary form.

You may benefit from participating in this study by having the opportunity to reflect upon your journey as a student, your academic and social experiences in college, and your attitudes about environmentalism. These reflections may assist you in deepening your understanding about yourself and/or others. The findings from this study may inform future directions for research and assessment in higher education. Regardless of whether you choose to participate in the study, you are eligible to enroll in a drawing for a $25 Amazon.com gift card.

By clicking the "YES" below the "I Consent to Participate" prompt and completing this questionnaire, you are agreeing to participate in the above described research project. If you select "NO" in response to the prompt, you will be automatically directed to the last page of the questionnaire, where you can provide your email address to register for the $25 Amazon.com gift card drawing. Thank you for your consideration, and please print a copy of this page for your records.

If you have any questions about this research project, please feel free to contact Andrew Wells at amwells@uga.edu. Questions or concerns about your rights as a research participant should be directed to the Chairperson, University of Georgia Institutional Review Board, telephone (706) 542-3199; email address irb@uga.edu.

Sincerely,
Andrew M. Wells, PhD Candidate
amwells@uga.edu

Diane Cooper, Professor
dlcooper@uga.edu
(706) 542-1812

The University of Georgia
Department of Counseling and Human Development Services

APPENDIX F

Recruitment Letter

I am a doctoral candidate in the Counseling and Student Personnel Services program conducting dissertation research under the supervision of Dr. Diane Cooper at the University of Georgia. I invite you to participate in a research study to understand students' attitudes toward environmental justice.

The purpose of this study is to test a questionnaire I am developing that is designed to measure attitudes toward environmental justice. You must be between the ages of 18 and 24 to participate.

You have been randomly selected as part of a national survey of college students' attitudes toward environmental justice. By completing this electronic survey, you may be advancing research on college students' attitudes toward environmental issues. At the end of the questionnaire you will have the opportunity to provide your contact information in order to be enrolled in a drawing for an Amazon.com gift card.

The questionnaire should take no more than 30 minutes to complete. Your involvement in the study is completely voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are otherwise entitled. Once submitted, there will be no way to identify your responses and thus the researcher will be unable to redact them from the data set.

There are no known risks or discomforts associated with this research, but you may discontinue your involvement in this research study any time prior to submitting your responses on the online questionnaire. You may also choose to skip any question you are not comfortable answering.

Please note that Internet communications can be insecure and there is a limit to the confidentiality that can be guaranteed due to technology itself. If you are not comfortable with the level of confidentiality provided by the internet, please feel free to print out a copy of the questionnaire, fill it out by hand, and mail it to Andrew Wells, 413-D Aderhold Hall, 110 Carlton Street, Athens, GA 30605 with no return address on the envelope. The results of the research study may be published and published results will only be presented in summary form.

If you have any questions about this research project, please feel free to contact Andrew Wells at amwells@uga.edu. Questions or concerns about your rights as a research participant should be directed to the Chairperson, University of Georgia Institutional Review Board, telephone (706) 542-3199; email address irb@uga.edu.

Sincerely,
Andrew M. Wells, PhD Candidate
amwells@uga.edu

Diane Cooper, Professor
dlcooper@uga.edu

(706) 542-1812

The University of Georgia
Department of Counseling and Human Development Services

APPENDIX G

College and University Samples

Indiana State University is a four-year public university located in Terra Haute, Indiana. The institution enrolls over 13,500 students, and is classified as a doctoral university with moderate research activity.

University of California, Davis (UCDavis), is a large four-year public research university located in Davis, CA, and is classified as doctoral university: highest research activity. UCDavis enrolls over 28,000 undergraduate students and nearly 7,000 graduate and professional students.

University of Georgia (UGA) is the state flagship institution, located in Athens, GA. Enrolling nearly 28,000 undergraduates and over 8,500 graduate and professional students, the institution is classified as a doctoral university with highest research activity.

University of Maryland at College Park (UMD) is a four-year public university in College Park, Maryland, and classified as a highest research activity doctoral university. The institution enrolls over 37,000 students.

University of Minnesota, Crookston (UMC) is four-year public Carnegie type baccalaureate college in Crookston, Minnesota. The college enrolls just under3,000 undergraduate students.

University of Vermont (UVM) is a higher research activity public university in Burlington, Vermont. The state flagship institution enrolls approximately 10, 300 undergraduate students and 1,400 graduate students.

APPENDIX H

CHDS Research Pool Request

RESEARCHER INFORMATION
Primary Contact Researcher: Andrew Wells
Email Address: amwells@uga.edu Office/Lab Phone: (559) 240-8752

Faculty Primary Investigator: Dr. Diane L. Cooper
Email Address: dlcooper@uga.edu Office/Lab Phone: (706) 542-1812

STUDY INFORMATION
IRB Study Number: STUDY00002941
IRB Approval Date: 12/11/2015 IRB Expiration Date: 12/10/2020
IRB Approved Researchers: Andrew Wells, Diane Cooper
IRB Approved Eligibility Requirements (include all the information included in Section G: Human Research Participants): Eligible participants are undergraduate students aged 18-24.

Duration of Study (in minutes): 30 Two Part Study: ☐ Yes X: No
Number of participants approved by IRB: 145
Number of participants requested: 100
Required: Please provide a copy of your IRB Approval with this form.
Required: Please provide a copy of your IRB Approved Consent& Debriefing Forms with this form.
I have read the statement of Research Responsibilities and agree to abide by them. I understand that use of the CHDS Research Participation pool is a privilege. Finally, I acknowledge that failure to fulfill these responsibilities will result in my termination of access to the CHDS Research Participation Pool.

_____ _____
Researcher Signature Date Primary Investigator Signature Date
Return this form and the necessary attachments to the Research Participation Coordinator: Dr. Alan E. Stewart (chdsrpc@uga.edu), 408-D Aderhold Hall.

APPENDIX I

UC Davis IRB Approval

From: **Cynthia M Gates** cmgates@ucdavis.edu
Subject: External Research on UC Davis Campus
Date: June 17, 2016 at 10:17 AM
To: amwells@uga.edu
Cc: Timo Rico terico@ucdavis.edu, Marisol Mendoza mqmendoza@ucdavis.edu

CM

Adrew McMahan Wells
University of Georgia,

Dear Mr. Wells,

Thank you for reaching out to the IRB before conducting research activities on a UC Davis campus.

The UC Davis IRB Administration reviewed your study plan and agree that you may enroll employees and/or agents of UC Davis in this study on environmental justice. If you have any questions, please do not hesitate to contact me.

Kind regards,
Cindy

Cynthia M. Gates, J.D., R.N., C.I.P., C.C.R.P.
Director, Institutional Review Board
University of California, Davis
2921 Stockton Blvd., Suite 1400
Sacramento, CA 95817
916-703-9154

For questions about IRB submissions contact hs-irbeducation@ucdavis.edu or 916-703-9158

APPENDIX J

Indiana State University Approval Letter

Indiana State University
More. From day one.

Office of Sponsored Programs

Terre Haute, Indiana 47809
812-237-3088
Fax: 812-237-3092

June 15, 2016

Andrew McMahan Wells

Dear Andrew,

Dr. Willie Banks has delegated to me, in my role as IRB Administrator, the authority to grant permission for ISU students to participate in exempt and expedited level studies.

I have reviewed your request for involving ISU students in your study entitled, *Developing a Measure of College Students' Attitudes toward Just Sustainability.* It is my understanding that this low-risk study was approved at the exempt level by the IRB at the University of Georgia. It is understood that no ISU personnel or students are actively engaged in the research project per the federal definition of engaged (see guidance at http://www.hhs.gov/ohrp/policy/engage08.html, section B(4)). Therefore, your request to survey ISU students is hereby approved.

If you have questions about this letter, I can be reached by email at Dawn.Underwood@indstate.edu or by phone at 812-237-3088. Good luck with your research.

Sincerely,

Dawn F. Underwood

Dawn F. Underwood, Ph.D.
IRB Administrator
Associate Dean for Sponsored Programs

Cc: OSP General Files

APPENDIX K

Undergraduate Seminar Courses Sampled

Instructor	Department	FYOS Title
Thomas M. Lawrence	Engineering	"A Sustainable Future: Green Buildings and the Built Environment"
Nicholas Magnan	Agricultural and Applied Economics	"Foreign Aid and the Fight Against Global Poverty"
Thomas Houser	Art	"Green Design Yesterday, Today, and Tomorrow"
Catherine N. Clutter	Vice President for Instruction	"Learning Community Seminar: Sustainability—Law and the Environment"
Diane L. Cooper	Counseling and Human Development	"The Ropes to Skip and the Ropes to Jump"
David Berle	Horticulture	"Learning Community Seminar: Sustainable Food Systems—Feeding the World Without Harming the Environment"
Susana Ferreira	Agricultural and Applied Economics	"Green" Economics: Making It Profitable to Save the Planet?"
David F. Porinchu	Geography	"Global Climate Change: Causes and Consequences"
Gary T. Green	Forestry and Natural Resources	"Natural Resource Conservation Issues"
Michael Azain	Animal and Dairy Science	"What Are Those People Gonna Eat Next Week?"
Alberto E. Patiño-Douce	Geology	"Are Human Societies Prepared to Cope With the Increasing Scarcity of Natural Resources?"
Sandy D. Martin	Religion	"Christians and Current Issues "