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SUSTAINABILITY CURRICULUM INVENTORY AND LITERACY ASSESSMENT: THE INFLUENCE OF VALUES ON KNOWLEDGE OF AND PERCEIVED IMPORTANCE OF SUSTAINABILITY COMPONENTS

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by

David Drogos

B.S., University of Oregon, 2003

A Thesis
Submitted in Partial Fulfillment of the Requirements for the
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THESIS APPROVAL

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in the field of Forestry

Approved by:

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MAJOR PROFESSOR: Dr. Andrew Carver

The incorporation of sustainability education and sustainable practices in higher education serves several purposes. It prepares students for work in sustainability-focused professions, fosters environmentally responsible behavior in individuals, and helps to reduce the ecological impacts of the operational aspects of educational institutions. However, contemporary definitions of sustainability, which consider social, political, ecological, and economic influences on the environment, complicate educational initiatives. Distinct educational departments often consider sustainability through their specialized lens. Trans-disciplinary initiative must be enacted in order for sustainability education to reach its full potential. This paper outlines the results of an electronically administered faculty sustainability curriculum inventory as well as an electronically administered university-wide sustainability literacy survey that were conducted at Southern Illinois University. The relationship between individual values and perceived importance and knowledge of sustainability components are examined within the context of the Value-Belief-Norm theory.

While response rates for both surveys were relatively low, the faculty curriculum inventory survey was useful in identifying faculty members with an interest in sustainability education. These individuals could potentially work to spearhead curricular initiatives across the university. The survey also provided information that was used to create a sustainability course database and profiles of faculty members with an interest in sustainability education. Results for

the literacy survey indicate that respondents' perceived importance of sustainability components exceeded their knowledge of those components in every case. Respondents rated components grouped under both energy systems and individual integrity as very important or extremely important to a sustainable university community. However, all components were rated at or above relatively important. Ecocentric, altruistic, and traditional individual values served as reliable predictors of respondents' perceived importance of sustainability components. These results should encourage further research of the motivations for sustainability incorporation on a campus community when considered within the framework of behavioral models such as the Value-Belief -Norm Theory or the Theory of Planned Behavior.

ACKNOWLEDGEMENTS

This project would never have been completed without the support and guidance of my committee members, and support from my family and friends. I would like to express my most sincere gratitude to Dr. Erin Seekamp for her patience, expertise and support throughout this process. Dr. Andrew Carver and Dr. Logan Park deserve recognition primarily for offering their academic expertise, but also for their willingness to explore the topic of sustainability literacy with me.

The SIU Sustainability Council and the students of SIU are responsible for funding this project. I hope this research leads to a happier, healthier, and more sustainable campus community. Administering these surveys would not have been possible without the assistance of Kerry Grunloh, Rebecca Armstrong, and the staff at the SIU IT office.

Jarid Perrin deserves a great deal of credit for spending countless hours coding open-ended response data from these surveys. Thank you Jarid, and good luck in your future academic endeavors. My fellow forestry grad students did a spectacular job of creating an environment in which encouragement, comrade, and a helping hand were always there when I needed them. I wish you all the best of luck.

I would like to thank my friends and family for always believing in me. Lastly, I would like to thank Bridget Harrison for helping me experience the wonder and joy of the world when I needed it the most.

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CHAPTER 1

INTRODUCTION

As awareness of global environmental issues increases, the concept of sustainability is receiving increased attention. Born out of a reaction to a consumerist society's impact on the environment, sustainability is often viewed as a social movement that focuses on environmental protection. While many of the consequences of unsustainable practices manifest themselves in the ecological sciences (e.g., loss of biodiversity, resource exploitation, air and water pollution), nearly all are the result of interacting political, economic, and cultural influences on society. Furthermore, the negative impacts of unsustainable practices are unequally distributed throughout the world. This forces us to incorporate the concepts of justice, morality, and ethics into our understanding of sustainability.

Many educational institutions have begun to augment their focus on sustainable practices on campus grounds as well as in the curriculum. In addition to preparing students for a number of emerging environmental professions, universities are attempting to foster socially and environmentally responsible behavior in students, faculty, and staff. Unfortunately, in academia, many disciplines are limited in their ability to address foundational systematic shortcomings that are necessary to explore obstructions to sustainable practices (Dawe, Jucker, & Martin, 2005). While the ecological sciences often address sustainability in the classroom, other academic departments are generally allowed the flexibility to decide whether or not they want to introduce sustainability themes into their curriculum.

Ambiguous terminology used to define sustainability further its uneven integration into the curriculum. Fundamental to a sustainability definition is determining the type of system (e.g., ecological, economic, global, or cultural) to be sustained, its characteristics (e.g., scale, equitable distribution, or resource allocation efficiency), and the duration a resource can realistically be maintained in that system (Costanza & Patten, 1995). Yet, sustainability can arguably apply to more than one system, as suggested by such phrases as the "three pillars" or "triple-bottom-line." That is, contemporary definitions also incorporate ecological, social, and economic factors of sustainability, acknowledging interdependence between these factors and the inherent decision-making tradeoffs involved when working towards enhanced sustainability (Gibson, 2006). It is apparent that providing for an entity's continued persistence will necessitate the incorporation of many, if not all, of the systems in which that entity operates (Dawe et al., 2005). Furthermore, sustainability assessments are often criticized by the lack of integration between the "pillars"; that is, assessments continue to be conducted according to academic silos, with integration efforts occurring as an afterthought (Gibson, 2006). Therefore, it is important to integrate sustainability education across academic departments to enhance sustainability literacy across the university community.

Sustainability Literacy

Sustainability literacy does not simply refer to the acquisition of knowledge about sustainability. It refers to a skill set and a way of thinking that actively engages individuals in social, political, cultural, ecological, and economic aspects of sustainability (Hegarty, Thomas, Kriewaldt, Holdsworth, & Bekessy, 2011; Stibbe, 2009). Sustainability literacy implies more than being informed of an issue. The concept also requires the capability and willingness to actively work toward a sustainable existence.

Sustainability literacy, as described above, is linked to a more complex way of conceptualizing real world problems. Complex problems, sometimes referred to as "wicked problems", are characterized as having influences from, and effects on, systems above and below the nucleus of the problem (Allen & Gould, 1986). Furthermore, wicked problems affect multiple stakeholders that are members of a variety of citizen groups, governmental agencies, and cultural networks (Weber & Khademian, 2008; Kreuter, De Rosa, Howze, & Baldwin, 2004). Complexity arises because stakeholders have multiple perceptions of the same problems. Furthermore, stakeholders have differing and sometime conflicting objectives and goals, and they experience an unequal distribution of the costs and benefits associated with an undesirable situation (Head & Alford, 2008). Hull, Richert, Seekamp, Robertson, & Buhyoff (2003) explored how different understandings of environmental quality and different values confound both problem definition and the implementation of a solution. Thus, when problems are characterized as "wicked", solutions are never straightforward.

In natural resource management the use of scientific knowledge is essential for effective and cooperative decision making. However, it can be used to oversimplify a situation. Scientific knowledge must be viewed within the social atmosphere of the situation. Recognizing and incorporating cultural, political, and economic aspects of an issue that has interconnected networks of stakeholders may lead to a lasting and evolving solution (Berkes, 2009; Manring, 2007). This means working with multiple stakeholders, identifying competing goals, facilitating communication, and adapting to a unique social context. This combination of knowledge, skills and experience are all essential parts of sustainability literacy. Furthermore, incorporating sustainability into higher education requires an acknowledgement of and understanding the complexity of these issues.

Sustainability in Higher Education

A compilation of 21 universities symbolically assumed responsibility for sustainability education in 1990 at the President's Conference, a conference of university presidents hosted by Tufts University in Talloires, France. The result of the conference was the development of a ten-point action plan to combat environmental degradation. It states, "universities have a major role in the education, research, policy formation, and information exchange to make these goals possible" (AULSF, 1990, para. 4). Since then, international organizations concerned with sustainable development have advocated for the inclusion of sustainability components in educational curricula (UNECE, 2005; UNEP, 2005).

The process of learning the skills necessary for sustainable resource management, development, and lifestyles should not be limited to the classroom. Dawe et al. (2005) noted that educators need to serve as role models as well as teachers. In this way students can learn by example. Dawe et al. (2005) further described that the classroom experience should incorporate experiential, real-life learning where students are exposed to the complexity of sustainability issues that exist beyond university grounds. Higher education institutions can use campus operations to expose students to sustainability concepts and practices such as waste reduction, composting, renewable energy generation, and alternative forms of transportation. This aspect of sustainability education is intended to encourage individual behavioral changes. A more holistic approach is achieved when sustainability is taught in the classroom, through experiential learning, and by example. Many insist that a holistic approach is necessary for effective sustainability education (Dawe et al., 2005; Moore, 2005; Rowe, 2002; Warburton, 2003).

Incorporating the teaching of sustainability inside and outside the classroom is a difficult task. In addition to university budgetary obstacles, the complexity of sustainability issues may give administrators pause when they are considering developing these types of programs at their institutions. Training a school or university's faculty and staff to serve as sustainability mentors and educators is equally difficult. It is uncommon for academic departments to advocate the teaching of topics that stray from their disciplines (Jones, Selby, & Sterling, 2010). Furthermore, instructors may be intimidated by the broad scope of sustainability education. Zaman (2007) suggests conducting an audit of instructor sustainability literacy as a primary step to sustainability education. Information gathered in the assessment could then be used to direct faculty workshops or training sessions.

How sustainability education manifests itself likely differs from institution to institution. Several frameworks for the implementation of sustainability initiatives in higher education exist. One such framework was developed by the Association for the Advancement of Sustainability in Higher Education (AASHE). AASHE's Sustainability Tracking, Rating, and Assessment System (STARS) targets various segments of the university system to track progress toward sustainability on college campuses (AASHE, 2011). Sustainability literacy assessments are a part of the STARS program. Their primary purpose is to provide baseline sustainability literacy data across the campus community, as well as identify subject areas for curriculum initiatives, faculty development workshops, and staff outreach efforts. Assessments given at regular intervals can measure the effect that sustainability initiatives are having throughout the campus community.

Literacy assessments also increase awareness of sustainability and are useful in identifying human and physical resources for sustainability advancement. Sustainability literacy assessments can be conducted in conjunction with curriculum inventories and related outreach efforts. From a theoretical perspective, exploring how socio-psychological constructs (e.g., values) influence the extent to which members of a campus community perceive the importance of sustainability literacy may facilitate more targeted initiatives to increase campus sustainability literacy.

Values and Sustainability Literacy and Importance

The psychological and social sciences possess an extensive collection of research devoted to identifying the underlying factors that influence peoples' actions. Some of this research focuses on individual behaviors while some examines social groups, political entities, and other organizations.

One of the fundamental elements identified as a determining factor in peoples' behaviors is their values. Brown (1984) describes values in terms of preference. He describes the ordering of values as, "the setting by an individual of one thing before or above another thing because of a notion of betterness" (p. 232). According to Schwartz (1994), "the key to identifying the structure of value relations is the assumption that actions taken in the pursuit of each type of values have psychological, practical, and social consequences that may conflict or may be compatible with the pursuit of other value types" (p. 23). In other words, our values may be mutually exclusive regarding any topic but they may also work together to support a belief or action. It follows that what we value the most will have the most influence over our beliefs and decisions.

The Value-Belief-Norm theory of pro-environmental behavior postulates that an individual's values influence his or her beliefs, which determine that individual's personal norms; in turn, personal norms influence pro-environmental behaviors (Stern, 2000). According to this theory, knowing a person's values will offer insight into individuals' beliefs, such as the extent of knowledge about sustainability components and the perceived importance of sustainability components within a campus community. This research presented in this thesis documents a campus community's—Southern Illinois University (SIU)—sustainability knowledge (literacy) and its perceptions of the importance of an array of sustainability components, as well as assesses the relationships between four value types (i.e., biocentric, altruistic, traditional and egoistic) and self-reported assessments of sustainability literacy and perceptions of the importance of specific components of sustainability in higher education. If a relationship exists between value types, literacy, and/or perceived importance of sustainability components, this study serves as an important preliminary step toward examining the role of values and campus sustainability literacy on facilitating individuals' behaviors that promote sustainable decisions related to the multifaceted, complex (i.e., "wicked") problems faced by society today.

Funding

The research presented in this thesis was funded by grants from SIU's Green Fund. The fund is supported by a $10 per semester student fee and, is overseen by the SIU Sustainability Council. The Council works to promote sustainability among faculty, staff, and students at the University. In order to accomplish this mission, the Council funds initiatives targeting campus operations, the University's curriculum (including aspects of this study), and the surrounding community.

Funding for this project was used to 1) create a sustainability course inventory, 2) develop profiles of faculty with sustainability interests, and 3) conduct a campus wide sustainability literacy assessment.

Thesis Overview

The remainder of this thesis is presented in four chapters. Both Chapters 2 and 3 consist of reports that were requested by SIU Sustainability Council during the course of the research project. Specifically, Chapter 2 reports the results of a sustainability curriculum inventory. The curriculum inventory surveyed SIU faculty regarding their (a) perceptions of the integration of sustainability in the campus curriculum, (b) definitions of sustainability, and (c) level of interest in sustainability initiatives. Chapter 3 reports the results of a sustainability literacy survey. The literacy survey assessed the SIU campus community's (i.e., students, faculty, and staff) knowledge of sustainability components and perceived importance of those components to a university community. Chapter 4 presents data collected in the literacy survey to investigate the relationship between individuals' value orientations (i.e., biocentric, altruistic, egoistic, and traditional) and both sustainability literacy and perceived importance of sustainability components. The results are discussed in the context of the Value-Belief-Norm theory (Stern, 2000). Chapter 4 was prepared as a manuscript with the intention of eventually submitting for publication. The conclusion (Chapter 5) summarizes key findings and implications, discusses challenges encountered during the research project, and offers suggestions for future research.

CHAPTER 2

SIUC SUSTAINABILITY CURRICULUM INVENTORY

As awareness of global environmental issues increases, many educational institutions are augmenting their curriculum with sustainability courses, programs, certificates and degrees. The nature of an environmental or sustainability studies program at a given institution is shaped by a number of factors. These may include an institution's mission statement, existing environmental and sustainability content in the curriculum, incentives for interdepartmental cooperation, and the current level of interest in sustainability education among the faculty, staff, and students. The goals of this research project were to: (1) identify sustainability content in the university's curriculum; and, (2) develop a definition of "sustainability" that is specific to Southern Illinois University Carbondale (SIUC). Funding for a graduate research assistantship was provided by the SIUC Green Fund (Project 100504) to conduct this inventory. Data were collected through an internet-based survey in December 2010. Topics targeted in the surveys were inspired by the Association for the Advancement of Sustainability in Higher Education's (AASHE) Sustainability Tracking Assessment and Rating System (STARS).

Methods

Data were collected from faculty and instructors using the internet-based questionnaire tool SurveyMonkey™. The questionnaire was divided into three main sections. The first section was designed to develop a definition or list of criteria for sustainability at SIUC. Furthermore, respondents were asked to assess the level of sustainability literacy present in various demographic and operational segments of the SIUC community. The second portion of the questionnaire gave instructors the opportunity to report on components of sustainability in the classes they instruct in open-ended response format. The final section of the questionnaire was intended to assess respondents' interest in enhancing sustainability content and procedures in class content and campus operations.

A list of tenured, tenure track & non-tenure track faculty email addresses were obtained from Rebecca Armstrong in the Professional Constituencies Office. This list also included faculty from the School of Medicine, which is located in Springfield, Illinois. These faculty members, while not part of the Carbondale campus, were included in the sample pool because of the difficulty involved in locating and removing their email address from the list. A total of three members of the School of Medicine completed the survey. The Graduate School informed researchers that no such list was available for graduate students with teaching assignments. After deliberation about the sample pool burden involved with notifying the entire graduate student population of the study, it was decided not to include these instructors in the assessment. The exclusion of the subpopulation of teaching assistants is a limitation; however, the presence of sustainability in courses assigned to graduate students is likely not a constant, as typically assignments vary from one semester to three years.

Dillman's (2007) tailored design was used to guide survey development and administration. An initial request to participate in the survey was sent on November 29, 2010. A follow-up request was sent one week later on December 6, 2010, and a final request was sent on December 13, 2010. The survey remained open and accessible to respondents for one week after the final request was sent. Once researchers started analyzing the data it was discovered that the initial list of tenured, tenure track & non-tenure track faculty email addresses did not include any email addresses for faculty members from the College of Engineering. A list of these addresses was compiled through the College of Engineering's website. Requests to participate were sent to faculty in the College of Engineering on February 17, 2011, February 24, 2011, and March 2, 2011. The survey was closed one week after the final request was sent.

Results

Of the 1,552 faculty members who were sent the request to participate in the study, 153 began the survey, and 108 completed it (7% response rate). Data from the 45 incomplete surveys were included in analyses when appropriate. Thirty-nine faculty members opted out of the study by responding to one of the email requests. Most respondents were assistant professors (34.3%), associate professors (21.3%) or professors (27.8%) (Table 1). Respondents were typically from the College of Liberal Arts (22.2%), the College of Agriculture (21.1%), and the College of Science (16.7%) (Table 2). Respondents' departmental affiliations are listed in Table 3.

Table 1. Respondents' title (n=108).

Respondents' Title	Frequency	Percent
Assistant professor	37	34.3
Professor	30	27.8
Associate professor	23	21.3
Instructor	13	12.0
Adjunct faculty	2	1.9
Emeritus professor	2	1.9
Associate director	1	0.9
Total	**108**	**100**

Table 2. College affiliation of respondents that entered course information (n=90).

College	Frequency	Percent
Law	1	1.1
University Honors	1	1.1
Business	3	3.3
Mass Communication and Media Arts	4	4.4
School of Medicine	5	5.6
Applied Sciences and Arts	10	11.1
Education and Human Services	12	13.3
Science	15	16.7
Agricultural Sciences	19	21.1
Liberal Arts	20	22.2
Total	**90**	**100.0**

Table 3. Departmental affiliations of the respondents that entered course information (n=90).

Respondent's Department	**Frequency**	**Percent**
Agriculture	1	1.11
Animal science, food and nutrition	1	1.11
Criminology and criminal justice	1	1.11
Communication disorders and sciences	1	1.11
Classics	1	1.11
Dental hygiene	1	1.11
Economics	1	1.11
English	1	1.11
Educational psychology	1	1.11
Food and nutrition	1	1.11
Geology	1	1.11
Health education	1	1.11
Hospitality and tourism administration	1	1.11
Information systems and technologies	1	1.11
Kinesiology	1	1.11
Law	1	1.11
Molecular biology, microbiology, and biochemistry	1	1.11
Medical education preparation	1	1.11
Management	1	1.11
Marketing	1	1.11
Plant and soil science	1	1.11
Political science	1	1.11
Psychology	1	1.11
Sociology	1	1.11
Technical resource management	1	1.11
University honors	1	1.11
Workforce education and development	1	1.11
Urology	1	1.11
Agribusiness economics	2	2.22
Art and design	2	2.22
Agricultural systems	2	2.22
Animal science	2	2.22
Anthropology	2	2.22
Automotive technology	2	2.22
Finance	2	2.22
Journalism	2	2.22
Mathematics	2	2.22
Philosophy	2	2.22
Plant biology	2	2.22
Radio-television	2	2.22
Chemistry and biochemistry	3	3.33
Geography	3	3.33
Plant, soil, and ag systems	3	3.33
School or medicine	3	3.33
Architectural studies	4	4.44
Speech communication	4	4.44
Zoology	5	5.56
Forestry	6	6.67
Curriculum and instruction	7	7.78
Total	**90**	**100.00**

Results from each set of questions asked in the survey are provided in the following subsections. Descriptive statistics were calculated for scale questions (means, standard deviations, frequencies and percentages), and both Friedman tests and Wilcoxon signed ranks tests were conducted to determine differences in mean ranks between items with the significance value set at 0.01 to adjust for the multiple comparisons. Scale responses ranged from low values ("not at all interested", "not at all important" etc.) to high values ("extremely interested", "extremely important" etc.). Questions with "don't know" responses are presented in the graphs; however, these responses are not included in statistical tests. Responses for open-ended questions were coded[1] into categories and ordered according to frequency.

Perceptions of Sustainability Literacy

Respondents typically reported themselves as being more literate on sustainability than other faculty and instructors and the student body ($X^2(2) = 128.9$, $p < 0.01$) (Table 4). Significant differences were calculated in means between all groups (Z = -6.947; -5.709; -8.584, $p < 0.01$). Most respondents perceive themselves to be "very literate," while they perceive other faculty and instructors, as well as students, to be "somewhat literate" (Figure 1).

Table 4. Perceptions of sustainability literacy (0=Not at all literate, 4=Extremely literate) (n=153).

	Student Body	**Faculty and Instructors**	**Yourself**
Mean	1.72	2.4	2.83
Standard Deviation	0.8	1.02	0.93

[1]Three individuals tested the coding method until inter-rater reliability exceeded 90% accuracy. An additional researcher was trained in the coding method, and observed until coding patterns were consistent. Some open-ended responses are not included in this document due to sheer volume of input; and to uphold assurances of confidentiality.

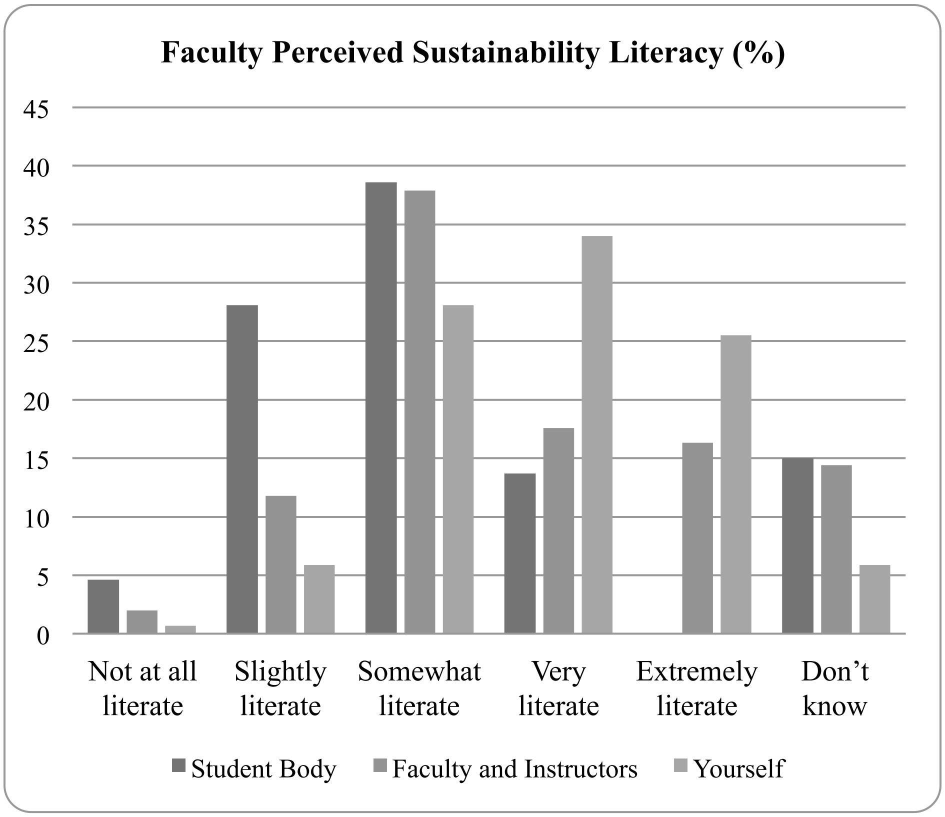

Figure 1. Faculty's perceived sustainability literacy of University population (n=153).

Importance of an Interdisciplinary or Holistic Approach to Sustainability Education and Sustainable Practices

Respondents reported that an interdisciplinary or holistic approach would be important to sustainability education (μ=2.86) and to sustainable practices (μ=2.93) (Table 5). Friedman's test revealed that the level of importance did not differ ($X^2(1) = 4.0$, $p = 0.05$). Most respondents believe that an interdisciplinary approach to sustainability education and sustainable practices is "very important," or "extremely important" (Figure 2).

Table 5. Importance of an interdisciplinary approach (0=Not at all important, 4=Extremely important) (n=153).

	Sustainability education	Sustainable practices
Mean	2.86	2.93
Standard deviation	1.08	1.08

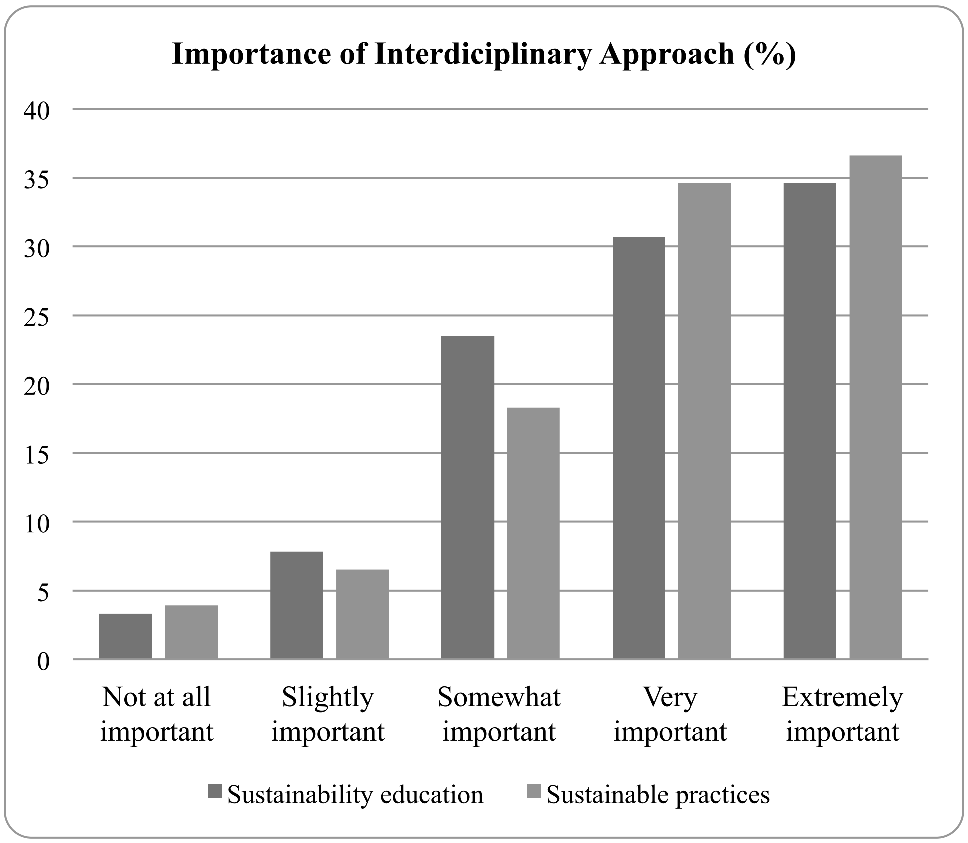

Figure 2. Importance of an interdisciplinary approach to sustainability education and sustainable practices (n=153).

Integration of Sustainability

Respondents reported the highest integration of sustainability in his/her specialization/program (μ=1.98; $X^2(4) = 45.2$, $p < 0.01$) with the lowest level of integration in core curriculum (μ=1.29) (Table 6). Overall respondents reported that sustainability was "slightly integrated" or "somewhat integrated" in all categories (Figure 3). However, a large percentage of respondents (37.9%) indicated that they did not know how well sustainability has been integrated into the core curriculum (Figure 3). Significant differences were calculated in means between all groups with the exception of comparisons of respondents' programs with their departments ($Z = -1.489$, $p < 0.01$), their departments and university operations ($Z = -2.107$, $p < 0.01$), and their programs and university operations ($Z = -1.425$, $p < 0.01$).

Table 6. The extent of integration of sustainability into various categories (0=Not at all integrated, 4=Extremely integrated) (n=153).

	Core Curriculum	**Your College**	**Your Department**	**Your Specialization/ Program**	**University Operations**
Mean	1.29	1.63	1.83	1.98	1.44
Standard deviation	0.91	1.04	1.28	1.25	0.78

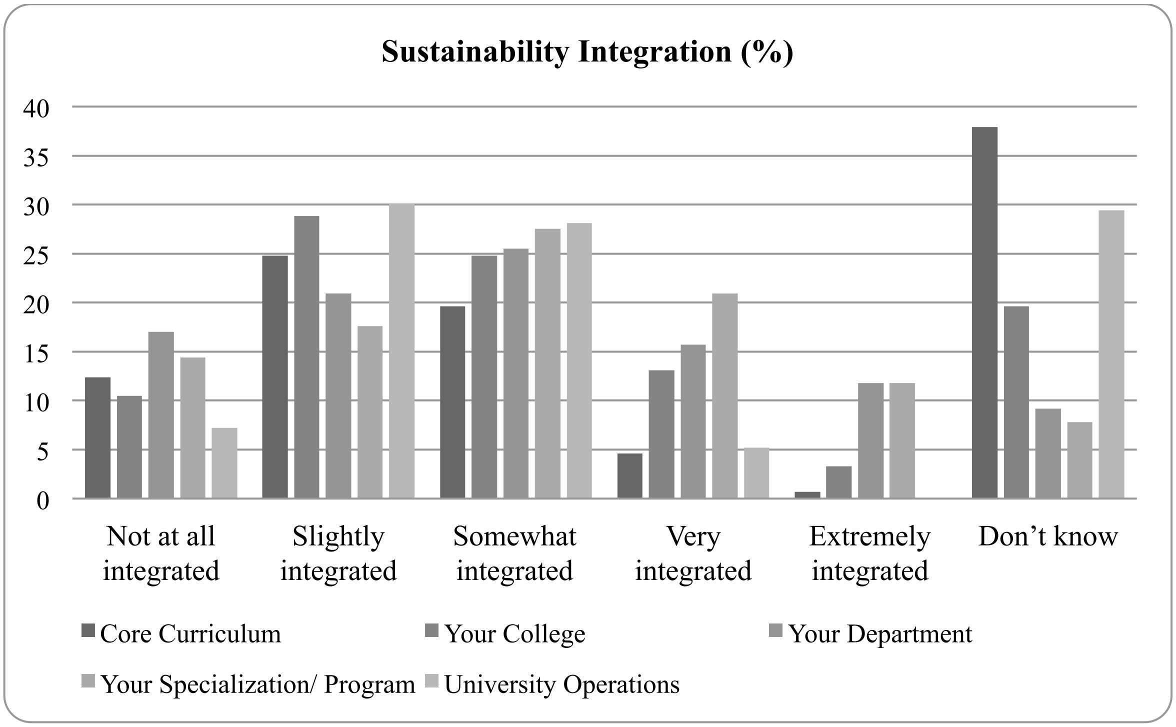

Figure 3. The percentage of perceived integration of sustainability into various categories (n=153).

Students' Exposure to Sustainability

Respondents report that students' exposure to sustainability through hands-on engagement is highest with regard to the natural communities of southern Illinois ($X^2(2) = 27.7$, $p < 0.01$) (Table 7); however, at least one-quarter of respondents reported that they "didn't know" students' exposure to sustainability for any of the three items (Figure 4). Respondents believe students are "slightly exposed" and "somewhat exposed" to social communities, natural communities, and co-curricular learning opportunities in southern Illinois. Few respondents believe that students are extremely exposed to sustainability through any of the mediums (1.3%, 2.6%, 1.3%) (Figure 4). Significant differences were calculated in means when comparing perceived exposure to sustainability through both natural communities and social communities ($Z = -4.659$, $p < 0.01$) and natural communities and co-curricular learning ($Z = -4.084$, $p < 0.01$).

Table 7. The extent that students are exposed to sustainability through hands-on engagement with various mediums (0=Not at all exposed, 4=Extremely exposed) (n=153).

	Social Communities of Southern Illinois	Natural Communities of Southern Illinois	Co-curricular Learning with Businesses, Governmental Organizations and Programs, or Community Based Institutions
Mean	1.38	1.83	1.40
Standard deviation	0.88	0.87	0.92

Strategies to Incorporate Sustainability into Courses

Respondents were asked if they were interested in learning strategies to incorporate sustainability into their courses. A total of 108 faculty responded; 60 selected "yes", 33 selected "no", and 15 selected "not applicable." Respondents were then asked if they would be interested in learning strategies to incorporate sustainability into campus operations; 68 selected "yes" and 40 selected "no". Respondents were most interested in a seminar (μ=2.23) and/or workshop (μ=2.20) series (Table 8). Respondents were least interested in a book club ($X^2(2) = 49.7$, $p < 0.01$), with 35% of respondents reporting that they were "not at all interested" in a book club (Figure 5). Significant differences in means were calculated when comparing the interest levels in a book club with both a seminar series ($Z = -4.848$, $p < 0.01$) and a workshop series ($Z = -5.177$, $p < 0.01$).

Table 8. Level of interest in strategies to incorporate sustainability into courses (0=Not at all interested, 4=Extremely interested) (n=153).

	Seminar series	Workshop series	Book club
Mean	2.23	2.20	1.17
Standard deviation	1.06	1.14	1.30

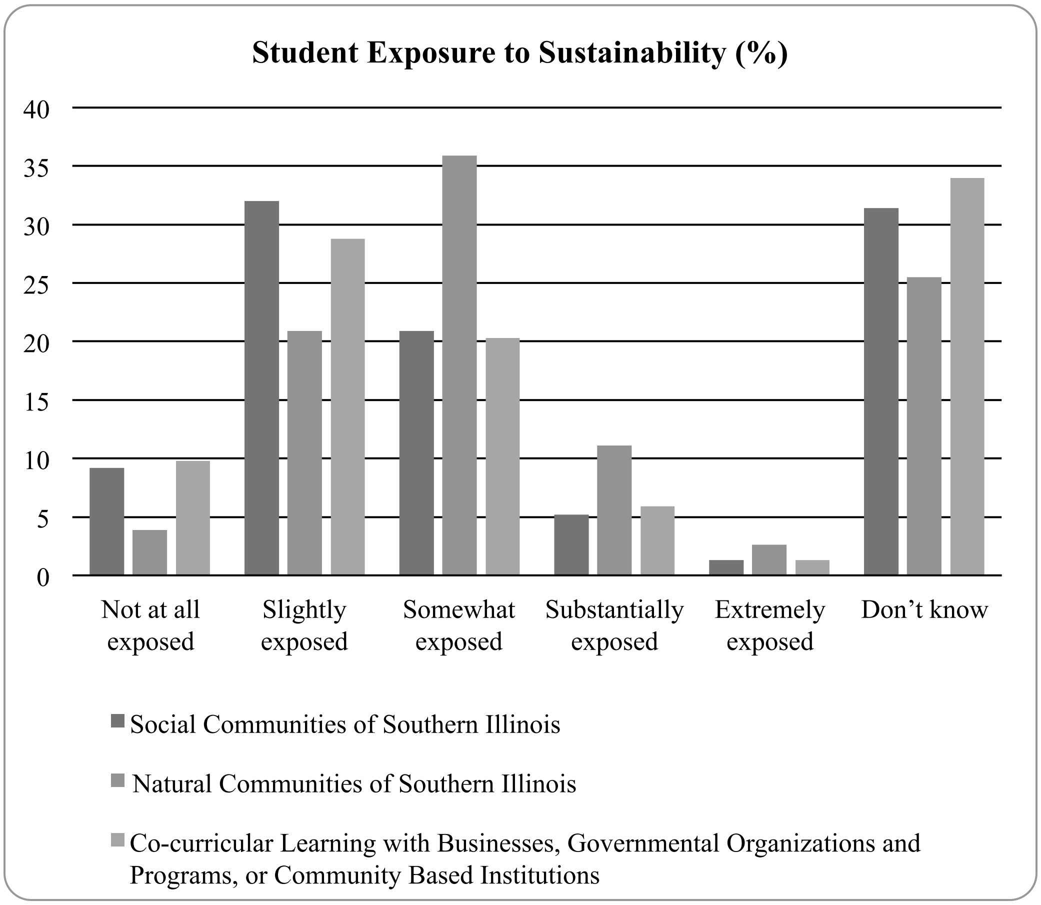

Figure 4. Student exposure to sustainability in the represented mediums (n=153).

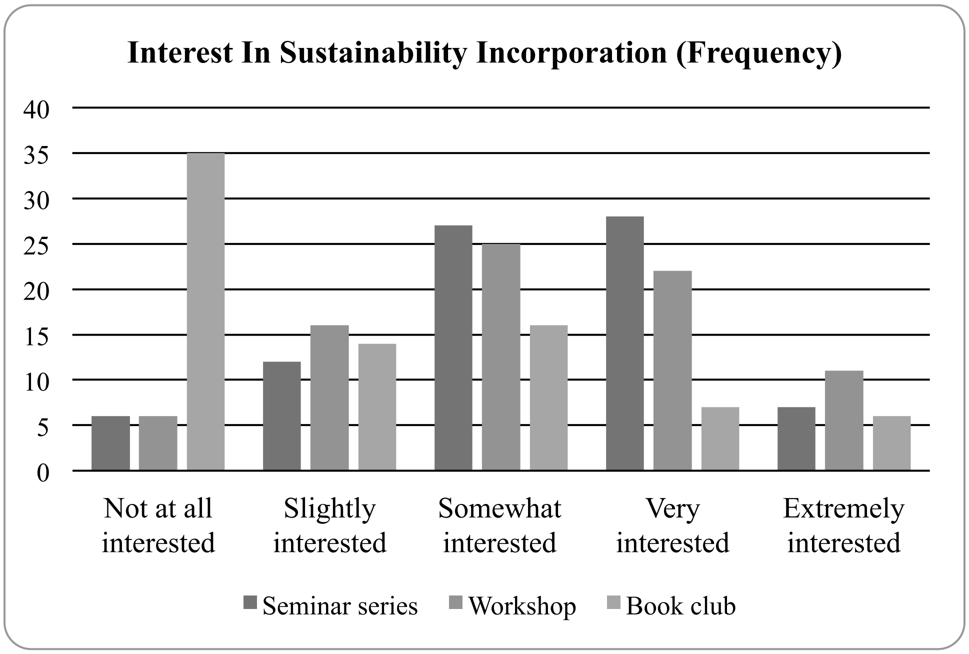

Figure 5. Level of interest for incorporating sustainability into courses with a seminar series, workshop, and a book club (n=153).

Respondents were asked to list other types of opportunities that they would like to have to learn ways in which they can incorporate sustainability into courses and/or campus operation. Suggestions included:

- Online seminar series
- Digital, online instruction
- Online series
- Online resources
- Coordinating/facilitating, in-community field experiences
- Material available by internet
- Classroom visits/presentations
- Curriculum core, field trips
- Funding

- Lecture development kits, factsheets, etc.
- Email, internet research
- Webinar might be more flexible
- I would like to see a resource web page
- Inter-departmental courses
- Learning modules or slides to drop into existing lectures
- Research opportunities
- Informational reading, DVD presentation

Sustainability Definitions

In defining sustainability, faculty and instructors included a wide variety of components. Responses were coded into a total of 37 distinct categories. The ideas of "resource consumption" and "durability, endurance, perseverance, and survival" were mentioned most frequently (Figure 6).

Essential Sustainability Criteria

Respondents were asked to list criteria essential to sustainability; responses were coded into 44 distinct categories (Figure 7). The ideas of "resource consumption" and "durability, endurance, perseverance, and survival" were present in the highest frequently. Overall response distribution was more varied when compared to the results obtained by coding definitions of sustainability.

Sustainability Subjects Underrepresented in the Curriculum

A large majority of respondents did not know which subject areas related to the environment and/or sustainability are underrepresented in the University's curriculum. Respondents frequently stated that all subject areas were missing (12), followed by interdisciplinary initiatives (9) and energy systems (9) (Figure 8).

Respondents were asked to provide specific course data. A total of 172 courses were reported across a wide spectrum of colleges and departments (Appendix A). Most classes were from the College of Agricultural Sciences (26.3%) or the College of Liberal Arts (22.2%) (Table 9). Course departmental headings are listed in Table 10.

Sustainability in Course Content

Respondents were asked to give a definition or list of criteria that best describes "sustainability" as it relates the courses they were reporting. Responses were coded into categories. Frequencies are reported in Figure 9. Ecological systems (17) were most frequently referenced as a component of sustainability present in reported classes. This is followed by human-ecological systems (11) and environmental preservation (11). A total of 40 categories were identified from the responses.

Interest in Serving on a Curriculum Committee

Respondents were asked to provide their email if they were interested in serving on the Sustainability Council *Working Curriculum Committee.* Twenty faculty members provided an email address; these email addresses have been forwarded to the Sustainability Council's chair of Curriculum Committee.

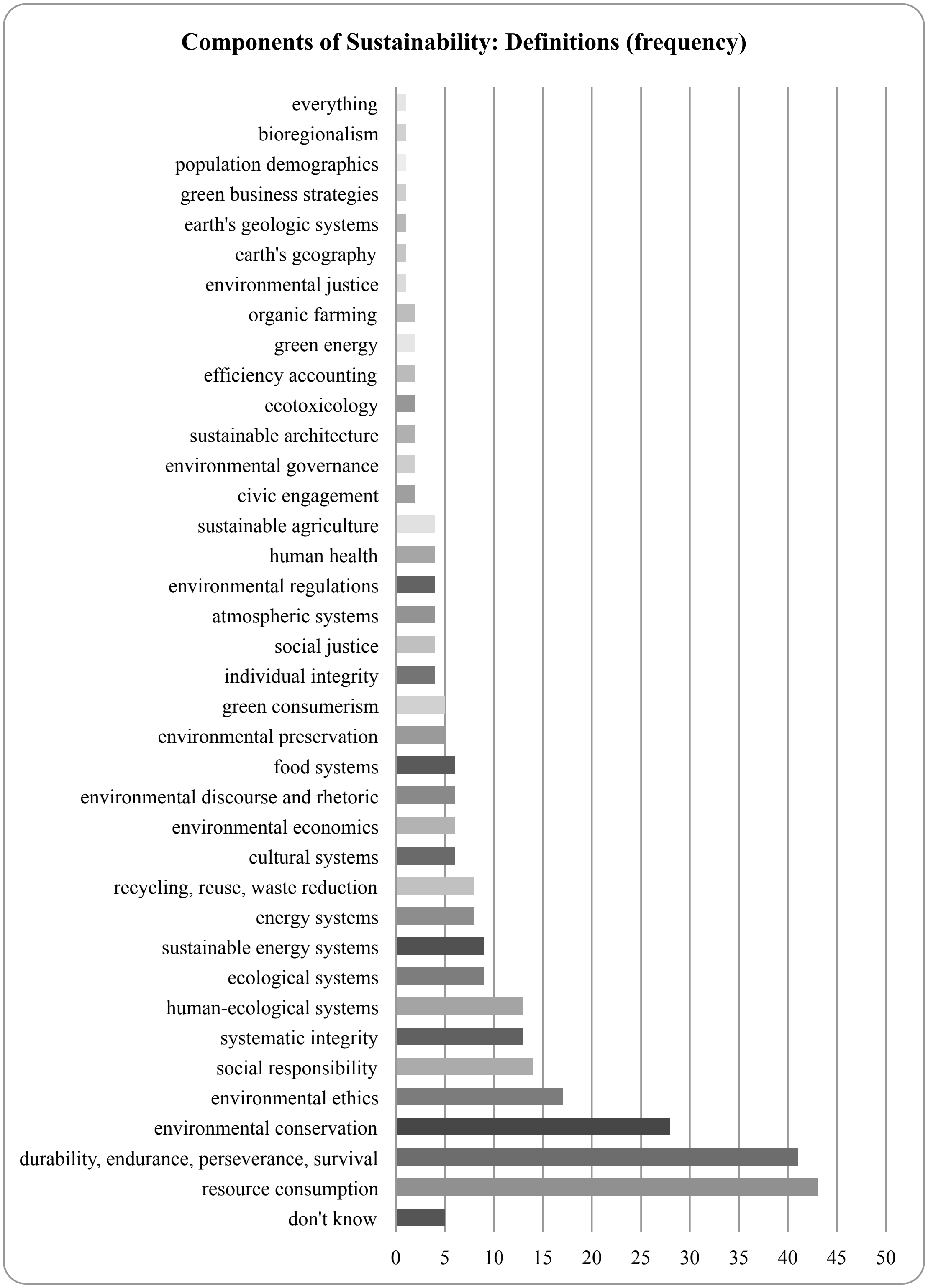

Figure 6. Frequency for definitions of sustainability

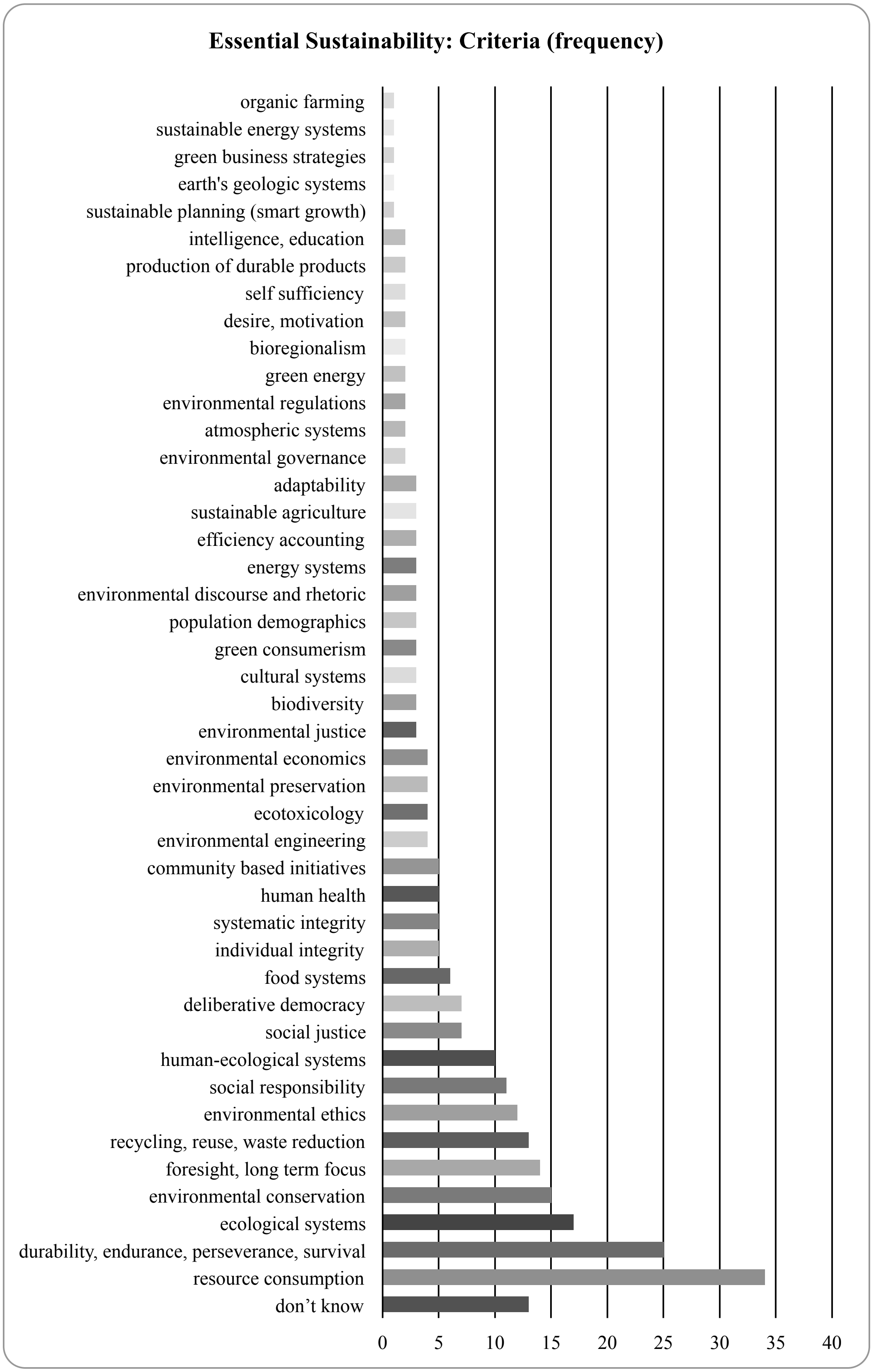

Figure 7. Frequency of criteria essential to sustainability.

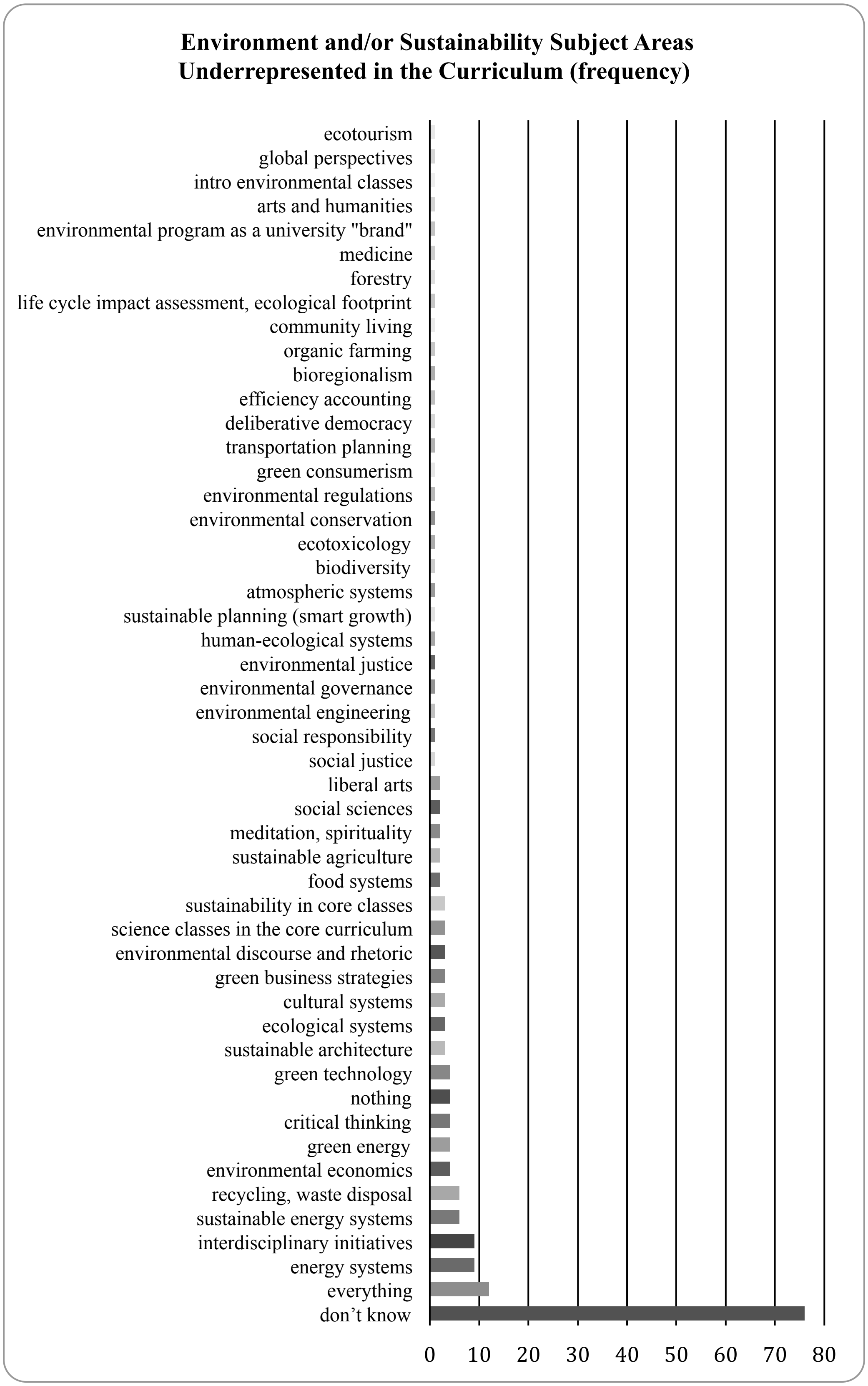

Figure 8. Frequency of underrepresented subject areas in the curriculum.

Table 9. Frequency and percent of College affiliation for reported classes. (n=167).

College	Frequency	Percent
Law	2	1.2
University Honors	3	1.8
Business	4	2.4
Mass Communications and Media Arts	6	3.6
School of Medicine	7	4.2
Applied Sciences and Arts	18	10.8
Education and Human Services	19	11.4
Science	27	16.2
Liberal Arts	37	22.2
Agricultural Sciences	44	26.3
Total	**167**	**100.0**

Table 10. Frequency and percent of department affiliation for reported classes. (n=169).

Department	Frequency	Percent
Agriculture	1	0.6
Biology	1	0.6
Communication disorders and sciences	1	0.6
Classics	1	0.6
Dental hygiene	1	0.6
Economics	1	0.6
English	1	0.6
Food and nutrition	1	0.6
Geology	1	0.6
Health education	1	0.6
Hospitality and tourism administration	1	0.6
Information systems and technologies	1	0.6
Molecular biology, microbiology, and biochemistry	1	0.6
Management	1	0.6
Psychology	1	0.6
Science	1	0.6
Workforce education and development	1	0.6
Animal science, food and nutrition	2	1.2
Criminology and criminal justice	2	1.2
Finance	2	1.2
Human nutrition and dietetics	2	1.2
Kinesiology	2	1.2
Law	2	1.2
Medical education preparation	2	1.2
Microbiology	2	1.2
Marketing	2	1.2
Philosophy	2	1.2
Political science	2	1.2
Urology	2	1.2
Agribusiness economics	3	1.8
Agricultural systems	3	1.8
Animal science	3	1.8
Chemistry and biochemistry	3	1.8
Journalism	3	1.8
Mathematics	3	1.8
Radio-television	3	1.8
School or medicine	3	1.8
Technical resource management	3	1.8
University honors	3	1.8
Art and design	4	2.4
Anthropology	4	2.4
Automotive technology	4	2.4
Educational psychology	4	2.4
Plant and soil science	4	2.4
Sociology	4	2.4
Plant biology	5	3.0
Geography	7	4.1
Architectural studies	8	4.7
Plant, soil, and ag systems	8	4.7
Speech communication	8	4.7
Curriculum and instruction	10	5.9
Zoology	10	5.9
Forestry	18	10.7
Total	**169**	**100.0**

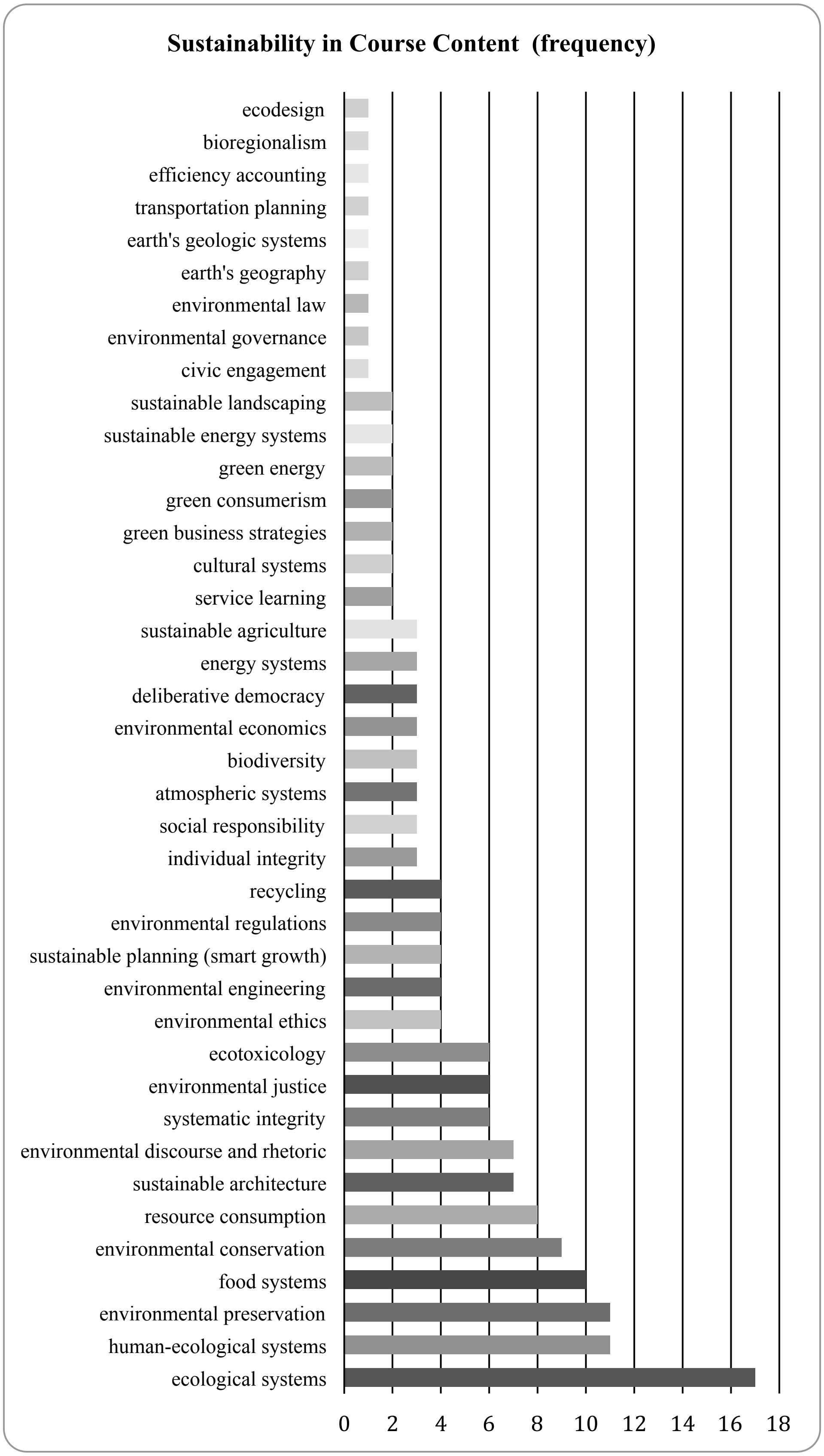

Figure 9. Frequency of sustainability content in courses.

Summary

The response rate for the survey was extremely low for survey research (7%), indicating a relatively low level of interest in sustainability amongst SIUC faculty or limited awareness regarding the ways in which sustainability applies to specific disciplines. However, the total number of surveys completed (108) indicates that a core group of faculty and instructors are interested in the integration of sustainability concepts into the university curriculum. Over one-half of faculty completing the survey reported affiliations with the colleges of Liberal Arts, Agricultural Sciences, and Science, with the departments of Curriculum and Instruction, Forestry, and Zoology offering at least ten classes each with sustainability content.

Given the low response rate, it is not surprising that most of the respondents rated themselves as more literate on the concept of sustainability than the rest of the University community. Respondents rate students as being less literate in sustainability than both themselves and their fellow faculty members. Respondents rated students and other faculty as “somewhat” literate. This indicates that there is at least a perceived minimum level of sustainability literacy across the campus.

The majority of respondents believe that an interdisciplinary or holistic approach to sustainability is either “very” or “extremely” important to both sustainability education and sustainability practices. However, they do not believe that sustainability had been integrated extensively into either the university educational structure or university operations. Respondents show the most interest in utilizing workshops or a seminar series as a means for learning how to incorporate sustainability into their courses. Open-ended responses reveal a preference for digital or online resources.

In defining sustainability, the concepts of durability, endurance, perseverance, and survival are commonly mentioned. Additionally, there is a recurrence of the notion of resource consumption. When listing criteria essential for sustainability, respondents reference these same concepts more frequently than others but to a lesser degree when compared to their definitions of sustainability. Additionally, the number of categories created when coding the criteria listed as essential for sustainability is higher than the number of categories created when coding respondents' definitions of sustainability. This may indicate that the criteria necessary for sustainability are not necessarily identified by its definition.

An overwhelming number of respondents indicate uncertainty about the components of sustainability education or environmental education missing from the curriculum at SIUC. However, some faculty report that "everything" is missing, and that "energy systems" and "interdisciplinary initiatives" are missing. This is particularly concerning; as respondents typically report that a holistic or interdisciplinary approach is important to sustainability education. A lack of interdisciplinary or cross-disciplinary initiatives may be indicative of a lack of information sharing between colleges, departments, and specializations. This may also explain why more than one-half of respondents claim that they do not know which subject areas related to the environment and sustainability are underrepresented in the curriculum.

When asked to define sustainability or list sustainability criteria in relation to a faculty's own courses, definitions and criteria varied. However, the most frequently mentioned criteria were coded under the subheading "ecological systems." Other categories frequently mentioned include "food systems," "sustainable architecture," and "environmental discourse and rhetoric." Although these data illustrate diversity of sustainability topics, it is apparent that most courses containing content related to sustainability are based in ecology.

CHAPTER 3

SIUC SUSTAINABILITY LITERACY ASSESSMENT

This research project is the continuation of a campus wide sustainability assessment. Initial data, gathered as part of a Sustainability Curriculum Inventory (Green Fund Project 100504), were analyzed to identify sustainability content in the university's curriculum, and develop a definition of "sustainability" that is specific to Southern Illinois University Carbondale (SIUC). The goal of this research project was to assess the literacy of the SIUC community on specific components of sustainability, analyzing literacy levels for students, faculty, and staff. Funding for a graduate research assistantship was provided by the SIUC Green Fund (Project 101110) to conduct this inventory. Data were collected through an internet-based survey administered between April and May of 2011. Topics targeted in the surveys were based on the sustainability definition (and components of sustainability) developed in the previous study (Green Fund Project 100504), as well as by the thematic content of the Association for the Advancement of Sustainability in Higher Education's (AASHE) Sustainability Tracking Assessment and Rating System (STARS). This report presents baseline data that can be utilized in future campus sustainability literacy assessments to evaluate the impact of curriculum initiatives, faculty development workshops, and outreach efforts.

Methods

Data were collected from SIUC students, staff and faculty in 2011 using an internet-based questionnaire administered with SurveyMonkey™. A list of student and employee email addresses was obtained through the Illinois Freedom of Information Act. Due to email spam restrictions, researchers were required to employ the mass email generating software

WorldMerge™. Dillman's (2007) tailored design was used to guide survey development and administration. An initial request to participate in the survey was sent on April 26, 2011. A follow-up request was sent on May 3, 2011, and a final request was sent on May 9, 2011. As an incentive to participate, respondents that completed the survey were eligible to win one of three $50 gift cards to Barnes and Noble bookstore. The survey remained open and accessible to respondents for one week after the final request was sent. The series of emails was sent to a total of 16,268 students and 8,356 employees. The SIUC Human Subjects Committee approved the survey instrument and email solicitation protocols.

Respondents were first asked to rate the similarity of the following definition of sustainability: *Sustainability is a transdisciplinary approach to ecological systems, cultural systems, energy systems, and food systems, with integrity of individuals and all systems as the goal*, when compared to their own definition on a seven-point Likert-type scale (not at all related, slightly related, somewhat related, moderately related, very close, extremely accurate, exact). They were then asked to rate their level of sustainability literacy based on the given definition on a seven-point Likert-type scale (not at all literate, slightly literate, somewhat literate, moderately literate, very literate, extremely literate, expert). The questionnaire also asked for respondents' perceived knowledge of 46 sustainability components (Appendix B) that were divided into the following categories: (1) individual integrity; (2) integrated systems integrity; (3) ecological systems; (4) cultural systems; (5) energy systems; and, (6) food systems. Basic demographic information was also gathered. Perceptions of knowledge were measured using a seven-point Likert-type scale (not at all knowledgeable, slightly knowledgeable, somewhat knowledgeable, moderately knowledgeable, very knowledgeable, extremely knowledgeable, I am an expert). This list of components was developed, in part, from the data collected during the fall 2010 Sustainability Curriculum Inventory (Green Fund Project 100504). The survey then asked respondents to rate the importance of the components to a sustainable university community on a seven-point Likert-type scale (not at all important, low importance, somewhat important, moderately important, very important, extremely important, essential), with a "don't know" response option.

Descriptive statistics were calculated for scale questions (means, standard deviations, frequencies and percentages). ANOVA summaries were generated to compare means among students, faculty, and staff for questions concerning the definition of sustainability. ANOVA summaries were also generated to compare means between students, faculty, and staff for knowledge of and perceived importance of grouped sustainability components categories, as well as of the individual sustainability components. Tukey post hoc tests were conducted to determine differences in mean ranks between groups with the significance value set at 0.05. Paired-samples t-tests were run between respondents' self-reported literacy on sustainability components and their perceived importance of those components to a sustainable university community. Means of grouped categories were compared using Friedman's test, and, where significantly different, analyzed using Wilcoxon's signed rank test. A Bonferroni adjustment was used when conducting post-hoc analysis. Scale responses ranged from low values ("not at all literate" = 0 and "not at all important" = 0) to high values ("I am an expert" = 6 and "essential" = 6) on a 7-point Likert-type scale.

Results

Of the 24,624 members of the SIUC community (16,268 students and 8,356 employees) who were sent the request to participate in the study, 1,116 completed surveys were collected

(4.5% response rate). The average time spent on the survey, based on timestamps from completed surveys that ranged from 5 minutes to 90 minutes, was 13 minutes and 43 seconds. An additional 684 respondents began the survey but did not complete it. It is, however, difficult to estimate the true potential sample size. It was discovered that several email requests were being sent with past dates posted on them. In some cases this resulted in the emails being inadvertently chronologically sorted in the senders email inbox. Furthermore, the WorldMerge™ software was recognized by some email addresses as spam. As such, some emails were never delivered. Given these restrictions, attempting to obtain a true sample size for the survey would be impossible.

At the beginning of the survey, respondents were asked to identify their role at SIUC. Most respondents were students (62.3%), followed by staff members (26.4%), then faculty (11.0%) (Table 11). At the end of the survey respondents were asked to provide additional demographic information. The majority of respondents had obtained a Bachelor's degree (28.3%) or a Master's degree (27.1%) (Table 12). More females (59.8%) responded to the survey than males despite accounting for only 45.5% of the total student body (Table 13). It should be noted that 38% of respondents started the survey but did not finish it. Completion rates are provided in Table 14. Demographic data for respondents that completed the survey are displayed in Table 15.

Table 11. Respondents' titles.

Respondents' Title	**Frequency**	**Percent**
Students	1108	62.3
Undergraduate	*635*	*35.7*
Master's student	*272*	*15.3*
Doctoral student	*201*	*11.3*
Staff	474	26.7
Faculty	195	11.0

Table 12. Respondents' levels of education.

Level of education	Frequency	Percent
Bachelor's degree	315	28.3
Master's degree	302	27.1
Some college	211	18.9
Doctorate	128	11.5
Associates Degree	93	8.3
GED or High school diploma	66	5.9

Table 13. Gender of respondents.

Gender	**Frequency**	**Percent**
Female	667	59.8
Male	449	40.2

Table 14. Survey completion rate.

Title	**Started**	**Finished**	**Completion %**
Students	1108	706	63.7
Undergraduate	*635*	*377*	*59.4*
Master's student	*272*	*186*	*68.4*
Doctoral student	*201*	*143*	*71.1*
Staff	474	273	57.6
Faculty	195	130	66.7
Total	1777	1109	62.4

Table 15. Demographic information of respondents who completed the survey.

Title	**N (%)**	**Gender (%**	**Year of Birth**	**Education**
Students	706 (64%)	57%	1983	Bachelor's
Undergraduate	*377 (34%)*	*58%*	*1987*	*Some College*
Master's	*186 (17%)*	*57%*	*1980*	*Bachelor's*
Doctoral	*143 (13%)*	*57%*	*1977*	*Master's*
Staff	273 (25%)	71%	1963	Bachelor's degree
Faculty	130 (12%)	49%	1962	Doctorate
Total	**1109**	**60%**	**1975**	**Bachelor's**

Compatibility of Sustainability Definition

Respondents were given the following definition of "sustainability": *Sustainability is a transdisciplinary approach to ecological systems, cultural systems, energy systems, and food systems, with integrity of individuals and all systems as the goal.* They were then asked to rate how similar the given definition was to their own. All groups (student, staff, and faculty) believe the definition to be "very close" or "extremely accurate" when compared to their own definitions ($\mu = 4.29$, $\mu = 4.45$, $\mu = 4.36$). No significant differences between the these groups were found [$F(2,1736) = 4.617$, $p = 0.10$]. In general, students, staff, and faculty share similar opinions about the accuracy of the given definition. Sample size, mean and standard deviation are reported in Table 16.

Table 16. Compatibility of given with personal definition of sustainability .

	Sample size (n)	Mean*	Standard deviation
Students	1096	4.29	1.37
Staff	452	4.45	1.23
Faculty	191	4.36	1.45

* Scale of response categories to "How closely does this definition of sustainability relate to your own?" (0 = not at all related & 6 = exact)

Perceived Sustainability Literacy

Respondents were asked to rate their level of sustainability literacy based on the given definition (stated above). On average, respondents rated themselves as "moderately" to "very" literate. When comparing between the responses of students, staff, and faculty no significant differences were found between the means ($\mu = 3.88$, $\mu = 3.73$, $\mu = 3.78$) [$F(2, 1734) = 4.617$, $p = 0.11$]. In general students, staff, and faculty have similar perceptions of their own level of sustainability literacy. Sample size, mean and standard deviation are reported in Table 17.

Table 17. Perceived literacy based on given definition of sustainability.

	Sample size (n)	Mean*	Standard deviation
Students	1088	3.88	1.34
Staff	459	3.73	1.16
Faculty	190	3.78	1.29

* Scale of response categories to "Based on the given definition how literate would you consider yourself to be on the concept of sustainability?" (0 = not at all literate & 6 = expert)

Knowledge and Perceived Importance of Sustainability Components

In the previously administered Sustainability Curriculum Inventory survey, faculty members were asked to identify essential components of sustainability and sustainability education. These components were compiled into a list and organized into the following categories: (1) individual integrity; (2) integrated systems integrity; (3) ecological systems; (4) cultural systems; (5) energy systems; and, (6) food systems (Appendix B). Respondents were presented with the individual components and asked to rate both their level of knowledge on the topic and their perceived importance of the component to a sustainable university community. Means, standard deviations, and sample sizes for each item in terms of knowledge and perceived importance are presented in Appendix C (Figures C1 & C2, and Tables C1-C6).

Comparing means for respondents' knowledge of sustainability components generated significant differences between students and staff on 23 of the components, with students reporting greater knowledge in all 23 cases. Students and faculty differed on 6 of the components in terms of knowledge, with students rating themselves as more knowledgeable in most cases (4 of 6; faculty reported greater knowledge of ecology and participatory democracy). Staff and faculty differed on 2 of the components, with faculty reporting greater knowledge of biodiversity and ecology. Comparing means for the importance of sustainability components generated 13 differences between students and staff, 1 difference between students and faculty, and 1 difference between staff and faculty. Trends illustrate that staff perceive greater importance in all of these cases except for environmental policy, where faculty are reporting greater importance than both staff and students.

Results of the grouped sustainability components indicated that respondents felt their degree of knowledge about components of sustainability was lower than the importance of that component to a sustainable university community (Figure 10). Results from paired-sample t-tests indicate significant differences between respondents' mean level of knowledge and mean perceived importance for specific components of sustainability in all cases (Table 18). The sample sizes associated with these tests differ from general comparative statistics due to pairwise exclusion of cases in which respondents selected the "do not know" option regarding their perceived importance of sustainability components.

Students tended to report slightly higher levels of literacy than faculty or staff for all grouped sustainability components (Figure 11), yet they tended to report slightly lower levels of perceived importance than faculty or staff for all but one of the group components (i.e., individual integrity; Figure 12). ANOVA comparisons between the responses of students, staff, and faculty for grouped sustainability components, identified significant differences between means for self-reported knowledge in the following comparisons: integrated systems management between students and staff; ecological systems between students and staff; cultural systems between students and staff; energy systems between students and staff, and faculty and students; and food systems between students and staff (Appendix C, Table C1). The only statistical difference found between the means for perceived importance was between students and staff in the category of food systems.

There was a statistically significant difference in knowledge depending on the grouped sustainability component ($\chi^2_{(5, N = 208)} = 214.49$, $p<0.05$). Reported levels of knowledge between most grouped sustainability components were statistically different (Table 19). No differences were found between knowledge of integrated systems integrity and cultural systems, and between ecological systems and energy systems. Respondents reported the greatest knowledge of individual integrity ($\mu = 3.44$) and the least knowledge of food systems ($\mu = 1.85$) (Appendix D, Figure D1).

There was also a statistically significant difference in perceived importance of the grouped sustainability components ($\chi^2_{(5, N = 1054)} = 2078.82$, $p<0.05$). Perceptions of importance between most grouped sustainability components were statistically different (Table 20). No differences were found between integrity systems integrity and ecological systems, and between food systems and cultural systems. Respondents reported energy systems as most important ($\mu = 5.35$) and cultural systems as least important ($\mu = 4.20$; Appendix D, Figure D2).

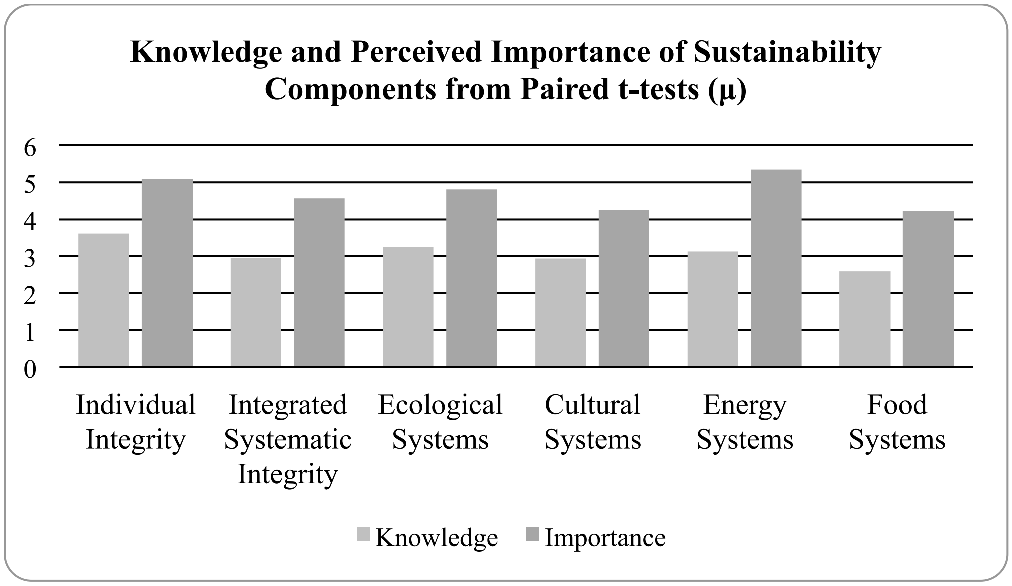

Figure 10. SIUC community's knowledge of and perceived importance of sustainability components as reported by paired sample t-tests, with all comparisons significantly different at p<0.05 (0 = not at all knowledgeable/important & 6 = expert/essential).

Table 18. Knowledge and importance of grouped sustainability components as reported in paired sample t-tests.

	Individual Integrity (n=1219)	**Integrated Systematic Integrity** (n=398)	**Ecological Systems** (n=603)	**Cultural Systems** (n=351)	**Energy Systems** (n=667)	**Food Systems** (n=372)
Knowledge						
Mean	3.62[a]	2.96[a]	3.25[a]	2.94[a]	2.80[a]	2.59[a]
Standard deviation	1.07	1.27	1.17	1.20	1.22	1.40
Cronbach's α	0.85	0.94	0.93	0.91	0.81	0.93
Importance						
Mean	5.09[a]	4.57[a]	4.81[a]	4.25[a]	5.35[a]	4.21[a]
Standard deviation	1.17	1.38	1.30	1.32	1.30	1.55
Cronbach's α	0.87	0.96	0.95	0.95	0.86	0.96

*Means of knowledge and importance within individual components that contain identical superscripts have significantly different means at p<0.05.

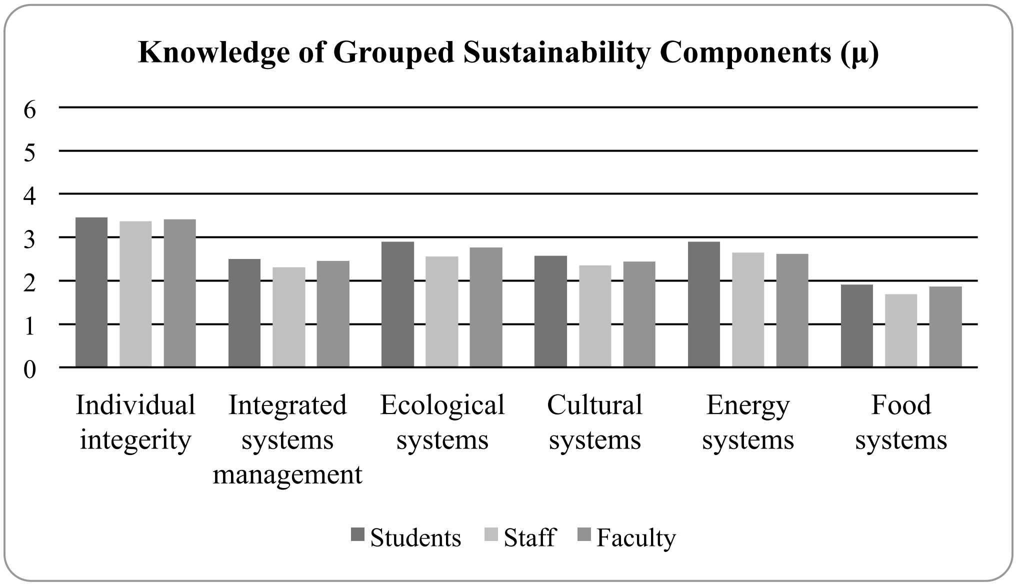

Figure 11. Comparisons of SIUC community's knowledge of grouped sustainability components (0 = not at all knowledgeable & 6 = I am an expert).

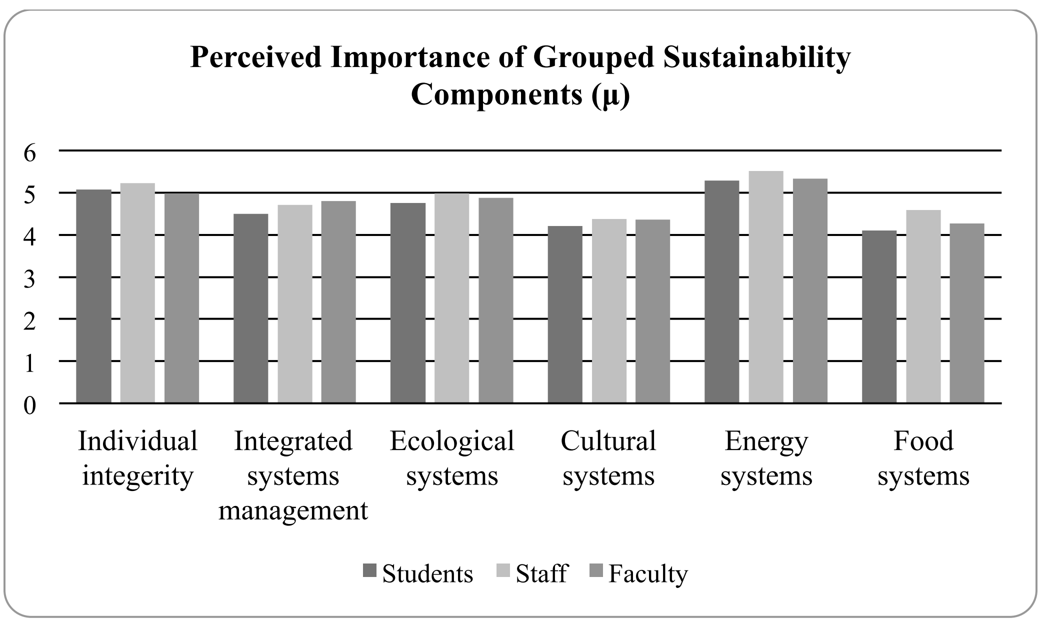

Figure 12. Comparisons of SIUC community’s perceived importance of grouped sustainability components (0 = not at all important & 6 = essential).

Table 19. Results of Wilcoxon signed ranked test comparing grouped knowledge components.

Wilcoxon Signed Comparisons	**Z-score**	**p-value***
Individual Integrity-Integrated Systematic Integrity	-28.82	<0.001
Individual Integrity-Ecological Systems	-20.03	<0.001
Individual Integrity-Cultural Systems	-25.80	<0.001
Individual Integrity-Energy Systems	-18.04	<0.001
Individual Integrity-Food Systems	-26.36	<0.001
Integrated Systematic Integrity-Ecological Systems	-15.64	<0.001
Integrated Systematic Integrity-Cultural Systems	-2.71	0.007
Integrated Systematic Integrity-Energy Systems	-13.17	<0.001
Integrated Systematic Integrity-Food Systems	-19.49	<0.001
Ecological Systems-Cultural Systems	-11.17	<0.001
Ecological Systems-Energy Systems	-0.28	0.778
Ecological Systems-Food Systems	-23.60	<0.001
Cultural Systems-Energy Systems	-11.38	<0.001
Cultural Systems-Food Systems	-20.09	<0.001
Energy Systems-Food Systems	-22.60	<0.001

*Significant level was set at $\alpha=0.003$ with Bonferroni correction for multiple comparisons.

Table 20. Results of Wilcoxon sign ranked test comparing grouped importance components.

Wilcoxon Signed Comparisons	Z-score	p-value*
Individual Integrity-Integrated Systematic Integrity	-9.42	<0.001
Individual Integrity-Ecological Systems	-7.62	<0.001
Individual Integrity-Cultural Systems	-12.29	<0.001
Individual Integrity-Energy Systems	-4.95	<0.001
Individual Integrity-Food Systems	-10.31	<0.001
Integrated Systematic Integrity-Ecological Systems	-2.09	0.037
Integrated Systematic Integrity-Cultural Systems	-7.65	<0.001
Integrated Systematic Integrity-Energy Systems	-8.39	<0.001
Integrated Systematic Integrity-Food Systems	-6.07	<0.001
Ecological Systems-Cultural Systems	-9.27	<0.001
Ecological Systems-Energy Systems	-10.24	<0.001
Ecological Systems-Food Systems	-7.26	<0.001
Cultural Systems-Energy Systems	-12.88	<0.001
Cultural Systems-Food Systems	-0.80	0.423
Energy Systems-Food Systems	-11.61	<0.001

*Significant level was set at α=0.003 with Bonferroni correction for multiple comparisons.

Discussion and Conclusions

When rating the similarity between the given definition of sustainability and respondents' own definitions, all groups of respondents (student, staff, and faculty) reported a "very close" to "extremely accurate" relationship. Taking into consideration the perceived obscurity and complexity of the sustainability concept, these data suggest that the given definition is appropriate and applicable to the SIUC community. Therefore, it is recommended that the university adopt this definition of sustainability.

Self-reported literacy of the given definition was between "moderate" and "very" literate for students, staff, and faculty. When considering the extremely low response rate (5% of the university community) and this level of literacy, it is likely that respondents completing the survey have a predetermined interest in sustainability and, thus, greater sustainability literacy than non-respondents. This finding is not unlike that for the 2010 Sustainability Curriculum Inventory survey in which a low response rate and moderate level of literacy indicate self-selection bias. It is likely that these skewed data do not adequately represent the level of sustainability literacy across the campus community. If disinterested individuals completed the questionnaire, then it is likely that campus sustainability literacy rates would be lower than found in the present study. In future literacy assessments, it is highly recommended that the SIU administration administer the study to increase response rates; however, caution will be needed when comparing future results to the results reported in this report.

When comparing means for self-reported knowledge and perceived importance of the ungrouped sustainability components, respondents report that a greater importance of the components exists than the knowledge that they hold. This is the case for all 46 components. Respondents claim to be the most knowledgeable ($\mu > 3.50$) about social responsibility, human health, social justice, environmental ethics, environmental conservation, renewable energy sources, and environmental preservation. It is interesting that the campus community—especially students—reports moderate literacy on three of the five components grouped under the heading "individual integrity," as this may indicate the propensity for individual action to enhance sustainability. Additionally, it is worth noting that the campus community reported moderate literacy rates for only two of the eight components grouped as "ecological systems" (i.e., environmental conservation and environmental preservation). These two ecological system components are much more general topics than the other ecological system components, illustrating the need for campus initiatives aimed at enhancing fundamental scientific knowledge related to ecological systems.

Respondents claim to be the least knowledgeable ($\mu < 2.00$) about permaculture, cultural ecocriticism, biomimicry, bioregionalism, literary ecocriticism, biodynamic agriculture, biointensive farming, the precautionary principle, efficiency accounting, and grass farming. Of utmost importance, is the fact that all of the food system components are included in this list, indicating the need for targeted initiatives aimed at increasing the campus community's knowledge about sustainable food systems. Additionally, the low level of literacy regarding the precautionary principle is startling, given the importance of this concept within every aspect of sustainability. This finding may provide the impetus needed for a greater campus commitment to integrating sustainability across the curriculum.

Respondents rated renewable energy sources, social responsibility, human health, energy efficient technology, environmental conservation, environmental preservation, resource consumption, environmental ethics, smart growth, social justice, and sustainable architecture as the most important components ($\mu > 5.00$) to a sustainable university community. Energy efficient technology and renewable energy sources account for two of the three components grouped under the heading "energy systems". This indicates that the SIUC community believes that a university's energy system is an important consideration when striving for a sustainable campus. This may suggest that campus initiatives to install both renewable and efficient energy technology would be supported by the university community. Furthermore, education initiatives on sustainable energy use may also be well received.

Of the seven components rated as having the lowest importance ($\mu < 4.00$), five were grouped under the heading "cultural systems" (environmental media, cultural ecocriticism, literary ecocriticism, environmental rhetoric, and environmental art). These data may represent a lack of exposure to these topics[2]. The results may also suggest that respondents believe sustainability is contained within the ecological or natural sciences fields. Furthermore, the assumption of skewed data (based on the low response rate) may be represented in these data in that those with a vested interest in sustainability and environmental health have obtained an inherent understanding of the ways in which we discuss, understand, and represent concepts and information relating to sustainability. In other words, this fundamental ability (i.e., relating sustainability to cultural systems) may be taken for granted by respondents. Regardless, increasing awareness of the important role cultural systems play in sustainability, as well as increased literacy in this area, is needed at SIUC.

In summary, respondents reported that a greater importance of the components exists than the knowledge that they hold. Furthermore, low to moderate levels of knowledge prevailed for all sustainability literacy categories. These data indicate that there is a university-wide deficiency of exposure to, or education on, most sustainability components. Educational initiatives are, therefore, warranted to increase sustainability literacy across the Southern Illinois University campus community in Carbondale, Illinois.

[2] This is likely to be true for the other lowest ranked components (biomimicry and bioregionalism) in terms of importance.

CHAPTER 4

VALUES AS PREDICTORS OF SUSTAINABILITY LITERACY AND PERCEIVED IMPORTANCE OF SUSTAINABILITY COMPONENTS

Purpose

Examine the relationship between social value orientations (SVO) and both sustainability literacy and perceived importance of sustainability components to a university community.

Design/methodology/approach

A survey administered to the entire Southern Illinois University (SIU) community (faculty, staff, and students) gathered respondents' self-reported literacy and perceived importance of sustainability components. The survey also employed a SVO scale in an attempt to gauge the values of biocentrism, altruism, egoism, and traditionalism in respondents. Factor analyses and reliability tests were used to analyze the SVO data and create composite measures; stepwise regressions were run with the composite SVO measures as the independent variables and sustainability knowledge as the dependent variable. Separate stepwise regressions were also run using perceived importance of sustainability components as the dependent variable and the composite SVO measures as the independent variables.

Findings

Relatively low response rates indicate a self-selection bias. Results likely represent a portion of the sampling universe with an interest in sustainability. The composite SVO variables were found to be substantially more reliable as predictors of an individual's perceived importance of sustainability components than knowledge of those components.

Research limitations/implications

Results of the perceived importance regression are consistent with the first relationship in the Value-Belief-Norm theory. Future research should expand testing to include respondents' behavioral norms. However, additional research should strive to obtain a sample that more represents individuals with well-developed traditional and egoistic value orientations.

Practical implications

The survey provided useful data for identifying sustainability components that are important to the SIU community, as well as identifying the sustainability components with which respondents were not familiar. These findings can be used to target sustainability literacy initiatives within the campus community.

Social implications

Evidence of a positive relationship between both biocentric and altruistic values and the importance of sustainability components was uncovered in the research. This knowledge will assist in identifying individuals that may be most receptive to sustainability initiatives in the university community.

Originality/value

The relationship between perceived importance of sustainability components and three of the four tested value orientations indicate that these variables warrant further testing in the full VBN model.

Sustainability Literacy Assessments in Higher Education

Initial attempts at merging sustainability with higher education manifested themselves in the form of international declarations created to address rising concern about declining environmental conditions worldwide. For example, the Stockholm Declaration was created in 1972, followed by the Tbilisi (1977) and Tallories (1990) Declarations. Despite good intentions, academic institutions often fall short of fulfilling the obligations stated in these documents (Wright, 2002). While it may seem that some academic institutions are using these pledges to greenwash their institutions, the lack of action is most likely due to the challenges of incorporating sustainability into curriculum and operations.

In order to help foster the infusion of sustainability in education, organizations such as the Association for the Advancement of Sustainability in Higher Education (AASHE) have been formed to provide resources and guidance to interested educators, administrators, and students. AASHE has developed a self-reporting grading system for higher education institutions called STARS (AASHE, 2011). The rating system is based on cumulative points that are given for the presence of certain characteristics, sustainability relevant data collection, or the implementation of sustainability related programs. The extensive grading system covers topics related to curriculum, campus operations, and student-based civic engagement. A primary benefit of the STARS program is that it guides schools through a comprehensive program that examines sustainability at their institutions while also expanding its presence.

Sustainability literacy assessments are a part of the STARS program. Initial sustainability literacy assessments provide baseline data regarding sustainability literacy across the campus community, as well as identify subject areas for curriculum initiatives, faculty development workshops, and staff outreach efforts. Repeated assessments can measure the effect of these efforts on sustainability literacy when compared with previous results. Literacy assessments also have the indirect effect of increasing awareness of sustainability; thus, the assessments can be conducted in conjunction with curriculum inventories and related outreach efforts.

Literacy can be measured by either quiz-like questions or self-reports of literacy.[3] A quiz-like questionnaire, with correct and incorrect answers, has the advantage of assessing actual knowledge, which may allow for more accurate comparisons of literacy through repeated testing. A self-reported questionnaire allows respondents to indicate their relative level of knowledge on a topic using a scaled response system. The advantage of this method is that it quantifies individual knowledge of sustainability components relative to other components. Such data can be used to target subject areas for educational initiatives.

Developing a literacy survey will depend on how an institution defines sustainability and their educational goals. Rowe (2002) succinctly summarizes an important obstacle to successful sustainability education in stating that, "Some higher education institutions only address one of the two components of sustainability: environmental literacy, or social responsibility/civic engagement" (p. 3). Combining these two elements ensures that students will learn of resource use and equity issues, the role they play in those issues, and the methods used to enact change. It follows that a sustainability literacy assessment should measure knowledge of all three components of sustainability—in particular, economic, social, and environmental measures—in addition to respondents' knowledge of components that affect change, such as social responsibility and civic engagement. Therefore, sustainability literacy does not simply refer to the acquisition of knowledge about sustainability's three dimensions; rather, it refers to a skill set and a way of thinking that actively engages individuals in social, political, cultural, ecological,

[3] AASHE details the requirements for sustainability literacy assessment reporting in the STARS Technical Manual found at: http://www.aashe.org/files/documents/STARS/stars_1.2_technical_manual.pdf.

and economic aspects of sustainability (Hegarty, Thomas, Kriewaldt, Holdsworth, & Bekessy, 2011; Stibbe, 2009). In other words, sustainability literacy implies not only being informed of an issue but also the capability and willingness to actively work toward a sustainable existence. Therefore, it is inferred that individuals with a value orientation toward the environment (e.g., biocentrism) or toward others (e.g., altruism) would likely perceive sustainability literacy as important within a higher education community and may thus be more knowledgeable of sustainability components.

The purpose of this paper is to report the findings of a campus-wide sustainability literacy assessment to explore the relationship between social value orientations (SVO) and sustainability literacy and perceived importance of sustainability components. More specifically, the goal of this research is explore the relationship between values and either self-reported sustainability literacy or perceived importance of sustainability components as a preliminary step to adapting the Stern's (2000) Value-Belief-Norn (VBN) Theory—a theory that models the various factors that influence environmental behaviors—for predicting the success sustainability initiatives in higher education have on influencing sustainable behaviors. The following section describes the VBN theory in relation to SVO and provides postulations about how sustainability literacy and perceived importance may be compatible with the VBN theory.

The Value-Belief-Norm Theory

In deciding to pursue a course of action, individuals view a situation through a complex set of factors that allow them to consider potential behavioral outcomes. Some behaviors, withdrawing from intense heat for instance, have clear and obvious causes. The causes of other human actions are less clear and are often dependent on a variety of demographic and social-psychological variables (Dietz, Stern, & Guagnano, 1998). To explore the effects of these variables, researchers have developed and tested several models that may lead to reasonably accurate predictions of environmental behaviors.

One model to assist with predicting environmental behaviors is Stern's (2000) Value-Belief-Norm theory (VBN), which proposes that the fundamental determinants of our actions are social value orientations (SVO). According to the VBN theory, values influence beliefs (i.e., environmental worldviews, awareness of the consequences, and ascription of responsibility), which in turn, influence pro-environmental personal norms (i.e., a sense of obligation to take pro-environmental action). These pro-environmental personal norms are precursory to an individual's behavioral intentions and/or behaviors (Menzel & Bögeholz, 2010).

The VBN theory has been used to test for antecedents to pro-environmental behavior on many occasions. Subsets of Schwartz's (1994) ten-universal value types (measured in 54 question items) have been used in VBN studies, with high internal reliability of composite variables, and document that self-transcendent values types (i.e., biocentric and altruistic) tend to have the greatest correlation to pro-environmental behavior (Nordlund & Garvill, 2002; de Groot & Steg, 2008). For example, Steg, Dreijerink, & Abrahamse's (2005) test of the full VBN model discovered significant relationships between the model's components moving from start (values) to finish (in this case judged acceptability of environmental policies). Furthermore, Steg et al. (2005) uncovered a significant direct, positive relationship between biocentric values and judged acceptability of environmental policies. Nordlund & Garvill (2003) also found significant direct, positive significant relationships between both self-transcendent and biocentric values and test subjects' willingness to reduce car use for collective environmental good. Their measure of egocentric values, while having significant relationships with the three belief components of the

VBN, fell short of directly influencing norms. In testing willingness to pay for park preservation, López-Mosquera & Sánchez (2012) found that biocentric and altruistic values lead to significant relationships throughout the VBN model, and that egotistic values failed to predict beliefs as measured by the New Ecological Paradigm (NEP; see Dunlap, Van Liere, Mertig, & Jones, 2000). Based on these and many other studies, it is clear that the VBN theory has structural validity and predictive power.

Again, this study explores the relationship between SVOs and self-reported sustainability literacy and perceived importance of sustainability components as a preliminary step to adapting the VBN theory to predict sustainable behavior within a campus community. The proposed model replaces the belief components (i.e., environmental worldviews or belief in the New Environmental Paradigm, awareness of consequences of not engaging in pro-environmental behaviors, and individual ascription of responsibility) with assessments of sustainability beliefs (i.e., literacy and perceived importance of sustainability components).

The NEP measures the degree to which individuals' perceive the human race to be affecting the biosphere (Dunlap et al., 2000). Specifically, the scale determines whether individuals perceive themselves to be a part from nature, or a part of nature. Although humanity's effect on nature has been increasingly scrutinized since rise of environmentalism in the 1970s (e.g., the NEP was first proposed in 1978 by Dunlap and Van Liere), the sustainability concept transcends solely prioritizing beliefs the negative effects of population growth, development and technology (hereafter, "progress") on the biosphere by also recognizing the social and economic considerations in determining the merit of progress (e.g., Barbier, 1987; Stern, Young, & Druckman, 1992). Thus, a need exists to consider not only the environmental impacts of our cultural, food and energy systems when assessing sustainable behaviors but also the social and economic impacts.

Knowledge of sustainability components or perceptions of the importance of sustainability components implies a certain degree of understanding about the consequences of the environmental, social and economic impacts of progress. As knowledge of those components increases, along with the role those components have in promoting sustainability, so will individual perceptions of ability to affect change or reduce threats to a sustainable existence. Thus, the sustainability concept also explicitly incorporates the role of integrity—both individual and system integrity—as a key to promoting sustainable communities and sustainable development (e.g., Agyeman & Angus, 2003; Hediger, 2000). Individual integrity and system integrity measures can be viewed as proxy measures of the beliefs about an individual's ascription of responsibility and awareness of consequences beliefs, as the loss of socio-ecological system integrity typically demarcates the loss of resilience (Walker et al., 2006), and acknowledging the role of the individual in consumption and community action is tantamount to the success of sustainability initiatives and a sustainable future (e.g., Middlemiss, 2010).

Therefore, this study explores the relationship between SVOs and perceptions of sustainability literacy and perceived importance of sustainability components. This study hypothesizes that biocentric and altruistic value orientations are positively related to sustainability literacy and perceived importance of sustainability components. If relationships are found between SVOs and sustainability literacy or perceived importance of sustainability components, the testing of the full VBN model in relation to engagement of sustainability initiatives within university communities is warranted.

Study Site Description

Southern Illinois University (SIU) in Carbondale, Illinois is a research university with a student enrollment of 20,037 (16,682 fulltime) at the time the research was conducted (spring semester of 2011). The student body was 45.8% female and 54.2% male, with an ethnic minority enrollment of 25.2%. The university had an estimated 5,000 employees. Approximately 1,500 of those employees were in teaching positions. The university's eight colleges are listed in Table 21.

Table 21. SIU Colleges*

College of Agricultural Sciences
College of Applied Sciences and Arts
College of Business
College of Education and Human Services
College of Engineering
College of Liberal Arts
College of Mass Communication and Media Arts
College of Science

**The university also has a Graduate School, a professional School of Law, and a professional School of Medicine. These Schools are not represented in this study.*

Sustainability and environmental studies have a limited presence at SIU. The University offers an interdisciplinary minor in Environmental Studies. The program incorporates courses from 25 departments that are organized into 5 focus areas (Table 22). The Department of Geography and Environmental Resources offers an undergraduate specialization in

Environmental Sustainability; the specialization is composed exclusively of courses from within this Department.

Table 22. Environmental studies minor focus areas.

Environmental Agriculture
Environmental Education
Environmental Engineering
Environmental Policy
Environmental Science

Sustainability initiatives on campus are primarily funded by a $10 per semester student fee. Students approved the fee in 2007 through a campus-wide referendum. The capital generated by this fee is managed by the Green Fund Committee, which is overseen by the SIU Sustainability Council. The Council works to promote sustainability among faculty, staff, and students at the University. In order to accomplish this mission, the Council funds initiatives targeting campus operations, the University's curriculum (including aspects of this study), and the surrounding community. The council has ratified the following definition of sustainability: "*Sustainability is a transdisciplinary approach to ecological systems, cultural systems, energy systems, and food systems, with integrity of individuals and all systems as the goal*."

Data Collection and Analysis

The study employed on-line survey research. Three requests to participate were sent to the entire SIU population (students, staff, & faculty). Dillman's (2007) Tailored Design Method was followed for enhancing response rate. Specifically, emails were sent to the university's email list (obtained via the Freedom of Information Act), which included an introductory email with a link to the survey and two reminder emails, each with links to the survey. As an incentive to participate, respondents that completed the survey were eligible to win one of three $50 gift cards to Barnes and Noble bookstore. The SIU Human Subjects Committee approved all survey research protocols.

The SIU Sustainability Council provided an initial list of sustainability components compatible with the Council's ratified definition. Indicators of these components were developed from the results from a separate faculty curriculum inventory survey in which SIU faculty were asked to define sustainability and list its essential components. The final 46 components were combined into the following six categories: cultural systems, ecological systems, energy systems, food systems, individual integrity, and integrated systematic integrity (Appendix B). Using a 7-point Likert-type scale, respondents were asked to rate their knowledge of the indicators for each sustainability component on a scale ranging from 0 = "not at all knowledgeable" to 6 = "expert". Respondents were asked to rate how important they believed each component to be to a sustainable university community on a 7 point Likert-type scale from 0 = "not at all important" to 6 = "essential," with a "don't know" response option.

Composite variables were constructed for each sustainability component in terms of knowledge and perceived importance. Specifically, data from each of the component indicators were averaged into one value for each respondent, for each of the six categories listed above. These values represent respondents' overall knowledge or perceived importance of the grouped components. Paired t-tests were used to determine if differences existed between respondents' self-reported knowledge of the sustainability components and the level of importance to which they ascribed to each component.

Respondents also completed a 12-item reduced version of Dietz, Fitzgerald, and Shwom (2005) value scale to test for the presence of four Social Value Orientations (SVO): altruism, egocentrism, traditionalism, and biocentrism (Appendix E). Altruistic values were defined by an emphasis on the following characteristics: social justice, correcting injustice, care for the weak, equality, equal opportunity for all, and harmony among people. Egoistic values were defined by an emphasis on the following characteristics: influential, having an impact on people and events, wealth material possessions, money, authority, and the right to lead or command. Traditional values were defined by an emphasis on the following characteristics: family security, safety for loved ones, honoring parents and elders, showing respect, self-discipline, self-restraint, and resistance to temptation. Biocentric values were defined by an emphasis on the following characteristics: protecting the environment, preserving nature, unity with nature, fitting into nature, respecting the earth, and harmony with other species.

The SVOs were measured in the questionnaire using a 7-point Likert-type scale to respond to the 12 value statements. Specifically, respondents were asked to rate how important each of the statements are as a guiding principle in their life. The scale ranged from -1 = "opposed" to 0 = "not at all important" to 5 = "extremely important". Confirmatory factor analysis was employed to create composite SVO variables and measure the internal reliability of each resulting SVO (Cronbach's alpha).

Two separate stepwise regressions were run with the four SVO composite variables as predictors of (1) the composite knowledge variables for each sustainability component and (2) the composite perceived importance variables for each sustainability component.

Results and Discussion

Response Rate and Descriptive Statistics

The survey was sent to 24,624 potential respondents. A total of 1,800 individuals began the survey and 1,116 completed it (4.5% response rate). The average time spent on the survey, based on timestamps from completed surveys that ranged from 5 minutes to 90 minutes, was 13 minutes and 43 seconds. A total of 706 students (4.3%), 130 faculty (9.0%), and 273 staff (4.0%) completed the survey. The majority of respondents from the literacy survey were female (59.8%). Of those that completed the survey, 377 were undergraduate students, 329 graduate students (186 master's students and 143 doctoral students), 273 staff members, and 130 faculty members. Seven individuals completing the survey could not be grouped into the given categories but had active roles in the university community. The response rate suggests that results cannot be generalized to the SIU population. As survey participation was voluntary, it is likely that the results are skewed to represent individuals with an interest in sustainability and the integration of sustainability components into the SIU community.

Paired t-tests revealed a significant difference ($p<0.05$) between the means of respondents' self-reported knowledge of specific composite sustainability components and their corresponding importance composite scores. In each comparison, respondents reported greater levels of perceived importance of the sustainability components than their reported knowledge of the composite components (Figure 13). A case can be made, based on these results, for sustainability education initiatives at SIU that target each component of sustainability measured in the survey. It is important to note that individual integrity, which encompasses the ethical components of sustainability, and energy systems were rated as approaching "essential" to a sustainable campus community. This suggests that campus sustainability initiatives that focus on civic engagement in energy savings may have enhanced success.

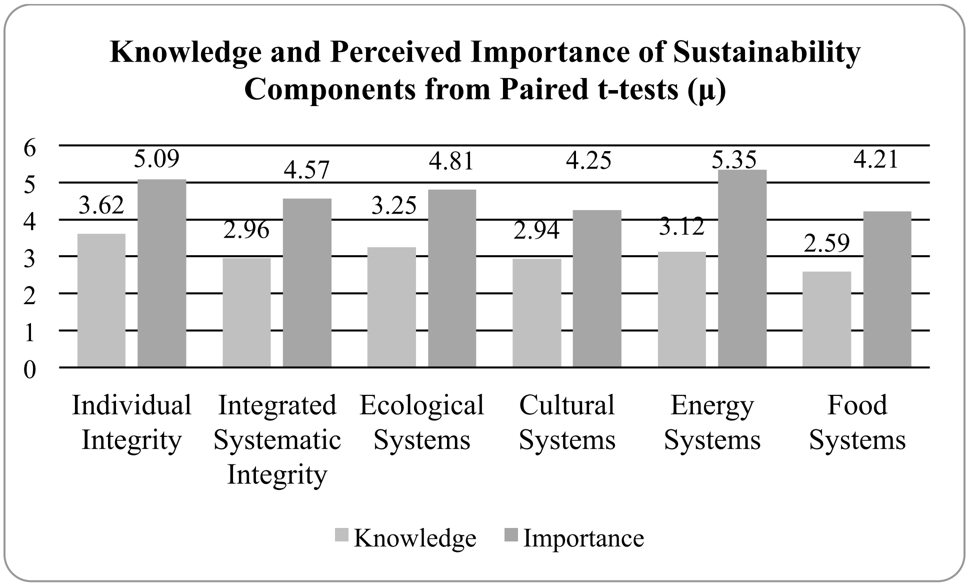

Figure 13. SIUC community's knowledge of and perceived importance of sustainability components as reported by paired sample t-tests, with all comparisons significantly different at $p<0.05$ (0 = not at all knowledgeable/important & 6 = expert/essential).

Factor Analysis and Reliability Testing

Confirmatory factor analysis produced a four-factor solution with Eigenvalues of 4.273, 1.754, 1.136, and 0.927. The decision to retain the four-factor solution was made based on the initial theoretical model containing four factors (the four SVOs). In total, the four factors explained 67% of the variance in the data gathered from the original 12 question items in the SVO scale.

The biocentric SVO was found to have the greatest internal reliability ($\alpha = 0.874$), followed by the altruistic SVO ($\alpha = 0.750$), the traditional SVO ($\alpha = 0.650$), and the egoistic SVO ($\alpha = 0.596$). These results indicate that, although biocentric, altruistic and traditional SVOs had high internal reliability, the internal reliability of the egoistic SVO was approaching unacceptable levels (George & Mallery, 2003). Higher biocentric reliability relative to other values was to be expected due to the potential response bias, in which respondents with interest in sustainability—still often first thought of as being related to environmentalism—may have increased participation rates in the voluntary survey. That is, having an interest in sustainability would intuitively be linked to pre-established biocentric values (i.e. unity with nature, respect for the earth, and protecting the environment) in the survey.

Table 23. Factor analysis and Reliability for SVO

Factor 1: Biocentric	**Loading**
Unity with nature, fitting into nature	0.881
Respecting the earth, harmony with other species	0.870
Protecting the environment, preserving nature	0.795
Eigenvalue	*4.273*
% variance explained	*21.008*
Cronbach's alpha	*0.874*
Factor 2: Altruistic	**Loading**
Equality, equal opportunity for all	0.829
Harmony among people	0.704
Social justice, correcting injustice, care for the weak	0.696
Eigenvalue	*1.754*
% variance explained	*16.787*
Cronbach's alpha	*0.750*
Factor 3: Traditional	**Loading**
Honoring parents and elders, showing respect	0.772
Self-discipline, self-restraint, resistance to temptation	0.707
Family security, safety for loved ones	0.687
Eigenvalue	*1.136*
% variance explained	*15.443*
Cronbach's alpha	*0.650*
Factor 4: Egoistic	**Loading**
Authority, the right to lead or command	0.831
Wealth, material possessions, money	0.731
Influential, having an impact on people and events	0.559
Eigenvalue	*0.927*
% variance explained	*14.187*
Cronbach's alpha	*0.596*

Regression Analysis

The step-wise regressions run with SVOs as predictors of each sustainability knowledge composite variable (Appendix F, Table F1), did not produce models with strong adjusted R^2 values. The low values suggest that respondents' values have little influence on their knowledge of sustainability components. This is possibly due to the multidisciplinary approach that encompasses sustainability. Effectively addressing complex sustainability issues requires a multi-disciplined approach that goes beyond biological sciences. While biocentrism is assumed to be a value that people interested in sustainability have, many of the components necessary for addressing sustainability issues that were included in this survey (i.e., civic engagement, population demographics, transportation planning, environmental law, policy & economics) are academically distant from biological and ecological sciences.

Despite the low adjusted R^2 values found in the stepwise regressions in which SVOs were used to predict self-reported knowledge of the sustainability components, a biocentric SVO was determined to be the primary predictor in all models with the exception of the "energy systems" composite, in which an egoistic SVO were determined to be the primary predictor. Taken in conjunction with the positive β-value for the egoistic SVO, this result may be explained by high cost of energy and the egoist SVO including wealth and material possessions measures. Since energy costs are hard to avoid, and dependent on the mode of production, it would follow that someone concerned with their wealth would keep abreast on the cost of energy based on the mode of production or have an interest in investing in sustainable energy solutions. Regardless, the limited predictive strength of SVOs in terms of self-reported knowledge of sustainability components fails to confirm the corresponding study hypothesis, suggesting that sustainability knowledge may not necessarily be similar to belief in the New Ecological Paradigm.

The step-wise regressions that were run with the dependent variables being each of the perceived importance of the sustainability components composite variables resulted in models with biocentric, altruistic, and traditional values as significant predictors in each case (Appendix F, Table F2). Egoistical SVOs were not found to be significant predictors in any models. The adjusted R^2 values for the importance regressions were far more substantial than those from the knowledge regressions and confirm the relationship between SVOs and perceived importance of sustainability components hypothesized in this research. Specifically, the six models in the importance regression had adjusted R^2 values ranging from 0.266 – 0.437. The regression coefficients for the three predictors were positive in all cases, with the biocentric SVO contributing most to the variance explained in the regression models. This suggests that individuals with biocentric, altruistic and traditional SVOs—particularly, biocentric—are more likely to support campus sustainability initiatives and to prioritize a sustainable university community.

The most notable result of the regression analysis was an increase in the predictive strength (adjusted R^2 values) of SVOs from regressions with composite knowledge variables as the dependent variable to regressions run with composite perceived importance variables as the dependent variable. The large adjusted R^2 values in the importance regressions indicate that respondents' SVOs influence what components they believe to be necessary for a sustainable campus environment. Despite the fact that SVOs have little predictive value in the level of knowledge of sustainability components, the predictive strength of SVOs on perceived importance of sustainability components in a campus community at least partially confirm this study's operationalization of the VBN theory, as biocentric, altruistic and traditional SVOs were found to influence sustainability beliefs.

Conclusion

Adapting educational structures to include sustainability education and sustainable practices is gaining global importance. Yet, obstacles to incorporate sustainability across the curriculum and within university operations are numerous. Programs, such as AASHE's STARS certification, are being developed to offer an outline for exploring and incorporating sustainability at higher educational institutions. For example, the STARS program advocates the use of sustainability literacy assessments to measure success of sustainability initiatives. This study attempted to identify characteristics in individuals (namely social value orientations) that may lead to support for and engagement in the implementation of campus sustainability initiatives through an adapted model of Stern's (2000) VBN model. Specifically, biocentric, altruistic and traditional SVOs were found to have a direct positive relationship to perceptions of the importance of six components of a sustainable campus community.

This study had several limitations that necessitate further research on the role of SVO in predicting sustainability beliefs and, ultimately, sustainable behaviors. First, the survey's low response rates indicate the potential for response bias (i.e., that respondents had a pre-established interest in sustainability), demonstrating the need for replication in settings with more representative samples. Second, reliability measures were within the acceptable range for the biocentric, altruistic, and, to a lesser degree, traditional SVO factors (George & Mallery, 2003); however, the low Cronbach's alpha value for the egoistic SVO factor indicates that individual's responses were not consistent within this factor and few respondents identified with the question items within this factor. This finding provides further evidence for the potential for response bias; that is, individuals with a pre-existing value orientations to protect the environment and social equity, and perhaps the type of conservation-minded consumption affiliated with traditional value orientations, self-elected to participate in the study.

Since participation in the survey was voluntary, the low response rates also suggest limited interest in or engagement with sustainability initiatives SIU. Replicating this study at SIU, using similar protocols, may demonstrate the effectiveness of sustainability initiatives implement after this study's survey questionnaire was administered. However, other institutions considering sustainability assessments should attempt to increase response rates. Increased response rates are also needed to verify the relationships found in this study and to test all of the relationships postulated by the VBN model to better predict campus support for sustainability initiatives and engagement in sustainability behaviors. For example, researchers could employ quota sampling techniques to collect responses from individuals that represent all academic colleges and departments, particularly those that are not traditionally aligned with sustainability concepts. Alternatively, researchers could engage the student population by including mandatory assessments as part of freshman class placement exams and senior class exist exams. Broadening the sampling demographic may lead to higher alpha values for egoistic and traditional SVOs and will increase the ability to generalize the results to an entire university community.

Despite these limitations, the exploratory nature of this study, and sustainability in higher education studies in general, as well as the strong relationships found between respondents' SVOs and their perceptions of the importance of sustainability components, demonstrate potential to adapt the VBN to pro-sustainability behaviors. Furthermore, the descriptive and predictive results provide some noteworthy implications to campus sustainability initiatives.

This study's results clearly show that a gap exists between knowledge of sustainability components and their perceived importance at SIU. These results can be used to strengthen appeals for sustainability initiatives and garner support from university administrators. Furthermore, initiatives that target sustainability components that are perceived to be more important relative to other sustainability components may likely receive more support from the university community. Sustainability advocates can also benefit from the SVO data gathered in this survey. Request to participate in sustainability initiatives can be tailored to appeal to personal goals, emotions, and values that are identified within individuals or the university community as a whole (Monroe, 2003; Pelletier & Sharp, 2008; Schultz & Zelezny 2003).

Although SVOs were not found be a strong predictor of sustainability knowledge, R^2 values found in the importance regressions suggest that SVOs influence sustainability beliefs. The range of adjusted R^2 values in the importance regression (0.266-0.437) are consistent with significant values found when examining the role of values as predictors in the social sciences. Steg et al. (2005) tested if the VBN theory was effective in predicting the acceptability of energy policy. They calculated an adjusted R^2 value of 0.25 in a multiple regression where biocentric, altruistic, egotistic values were used to predict acceptance of the NEP (the first relationship in the VBN theory). According to the VBN theory, components appearing earlier in the model (values and beliefs) are relatively stable. Furthermore, each preceding component influences the following one. Stern (2000) ascribes a chain of three successive variables to the belief section of the theory: (1) a person's worldview based on the New Ecological Paradigm (NEP) in which human action are believed to have substantial effects on the ecological health of the world (Dunlop et al., 2000); (2) whether a valued object is perceived to be threatened by a particular condition; and (3) whether any actions can be taken to mitigate the threat to the valued object. Steg et al.'s (2005) regression test of the progressive steps of the full VBN model produced adjusted R^2 values ranging from 0.25-.049 with the highest predictive value occurring with the inclusion of respondents' personal norms. Jansson, Marell, and Nordlund (2011) tested the VBN on the adoption of high involvement eco-innovations and observed similar results. They calculated an adjusted R^2 value of 0.247 for the initial relationship between SVOs and the NEP. Furthermore their adjusted R^2 values increased through a test of the full VBN model that included personal norms with a final value of 0.435. The increasing adjusted R^2 values in these test is encouraging for future tests of the VBN model that would look for sustainable behaviors in the campus community. Positive β values generated in this study for both biocentric and altruistic values in the importance regression are consistent with previous research that indicates self-transcendent values types have the greatest correlation to environmentalism.

Future research is needed to replicate this study and explore the role of sustainability beliefs in predicting sustainability behaviors and receptiveness to sustainability initiatives within higher education institutions. For example, research that includes sustainability behaviors—such as, faculty participation in curriculum workshops, students' engagement in dormitory energy conserving behaviors, participation in sustainability-focused community events, enrollment in sustainability-themed classes, and administrative support of operational procedures that increase campus sustainability—would greatly advance not only our theoretical understanding of the VBN but also campus sustainability.

CHAPTER 5

CONCLUSION

Key Findings

Both the faculty curriculum inventory and the sustainability literacy survey provided data and information that was useful in moving forward with sustainability initiatives at SIU. While response rates were low, the total number of respondents provided a general number of faculty that may be receptive to integrating sustainability across the SIU curriculum. Faculty respondents rating themselves as more literate than students and other faculty and instructors (Figure 1) support the claim that results are representative of individuals with an interest in sustainability, as do their belief that the their department or specialization has the highest level of sustainability integration compared with other academic units (Figure 3). The comparatively high response rate from staff members is encouraging because it may indicate the potential for sustainability incorporation into university operations.

Results from both the curriculum inventory and literacy surveys indicate support for a more holistic, interdisciplinary approach to sustainability that defines the concept of sustainability beyond a traditional ecological framework. Respondents support the notion that an interdisciplinary or holistic approach to sustainability is important to both sustainability education and sustainability practices (Figure 2). Data collected from staff, faculty, and students, reveled a high level of compatibility between personal definitions of sustainability and the proposed definition (Table 16), which included a trans-disciplinary approach to sustainability and a focus on individual and system integrity.

Results also helped to identify departments in the university that may be open to sustainability initiatives. The faculty curriculum inventory identified relatively high response numbers from the Speech Communication and Architecture Studies departments (Table 3). Both of which would not have obvious links to sustainability as it is defined in an ecological context. Identifying support in these departments could help strengthen the three-pillar or triple-bottom-line approach to sustainability integration.

Faculty do not believe that sustainability had been integrated extensively into either the university educational structure or university operations (Figure 3), and that students receive low levels of exposure to sustainability in the social community, natural community, and through co-curricular learning (Table 7). Respondents were predominantly uncertain when asked to identify components of sustainability education that was absent from the SIU curriculum at the time of the survey. This could indicate that interdisciplinary or cross-disciplinary initiatives may be warranted between university departments, colleges, and specializations. On the other hand, faculty reported with relatively high frequency that "everything" regarding sustainability education was missing from the curriculum. When asked about their preference for learning about methods to incorporate sustainability into the curriculum, respondents indicated a preference for workshops or seminars. Open-ended responses revealed a desire for digital or online resources if made available.

Energy systems and individual integrity were rated as very important or extremely important to a sustainable university community (Figure D2). The four remaining grouped components were also rated as being important to a sustainable university community. These findings support an interdisciplinary and holistic approach to sustainability literacy. Highly rated individual components included in the individual integrity group included civic engagement, environmental ethics, social justice, and social responsibility. These results suggest that individual actions and beliefs are believed to play an important role in environmentally responsible behaviors, and that universities should attempt to develop individual principals and morals when attempting to foster sustainability based behaviors and beliefs in individuals. Lower rated individual components included environmental art, environmental rhetoric, literary ecocriticism, biomimicry, cultural ecocriticism, environmental media, and bioregionalism. While respondents rated these components to be of lower importance relative to other components, they were all rated as above moderate importance.

Comparisons between knowledge and perceived importance of grouped sustainability components produced significant differences in each case with perceived importance exceeding knowledge (Figure 10). Respondents reported having the most knowledge about individual integrity, energy systems, and ecological systems, but mean response categories indicate that they were only moderately knowledgeable of these topics. Further, respondents reported being only somewhat knowledgeable of food systems (Figure D1). These results clearly indicate the need for sustainability initiatives—particularly in relation to, but not only limited to, food systems—at SIU.

Theoretically, this study provides evidence to expand the Value-Belief-Norm theory to sustainability behaviors within a campus community. A factor analysis of the SVO scale produced a four-factor solution with the lowest eigenvalue of 0.927. Despite this value being below the generally accepted value of 1.000 we decided to retain the four-factor solution since the theoretical SVO model had four factors. Biocentric, altruistic, and traditional SVOs were found to have high internal reliability, while responses to egotistical SVO scale questions were not as consistent among respondents (Table 23).

Stepwise regressions of SVOs on knowledge of grouped sustainability components produced low adjusted R^2 values (0.039-0.090), indicating that values are not strong predictors of sustainability knowledge (Table F1). Stepwise regressions of SVOs on perceived importance of grouped sustainability components produced adjusted R^2 values (0.266–0.437) that indicate a relationship exists between the two variables (Table F1). R^2 values from the importance regression are consistent with significant adjusted R^2 values from similar regressions in the psychological and social sciences. The results from the importance regression are encouraging for future research that may attempt to adapt the VBN theory to predict participation in campus sustainability initiatives.

Research Challenges

Low response rates limit our ability to generalize the results to the entire SIU community. Obtaining email lists for the curriculum inventory survey and the literacy survey proved challenging. Several requests to various administrative offices at the university failed to produce email lists for the faculty survey. After sending the three research requests for the curriculum survey, it was determined that faculty emails from the College of Engineering were not included in the email list that we had obtained from the Professional Constituencies Office at SIU. These email addresses were compiled from the College of Engineering's website, and separate requests were sent.

In order to compile email addresses for the literacy survey we made a request through the university's Freedom of Information Act office. The list provided did not include email addresses for students who had not provided contact information to the university. Furthermore, the list included multiple email addresses for many individuals. Due to restriction on mass emailing through university email accounts we chose to use the mass emailing software program WorldMerge to send the research requests for the literacy survey. For unexplained reasons, WorldMerge was assigning past dates to many of the emails. As a result many of the research request emails were being sent to the middle or bottom of email inboxes. It is possible that many potential respondents never opened these emails because of this error. Taking all these obstacles into consideration, determining the exact number of individuals that were invited to participate in the research was practically impossible.

Objectively coding open-ended responses to the curriculum inventory survey proved to be a difficult task. It was apparent that a few respondents were under the impression that the survey was concerned with sustainable literacy (i.e., sustaining literacy or knowledge gained by students while enrolled in an educational institution) rather than sustainability literacy (i.e. the knowledge and skill set required to advance sustainable living in modern society). As a result data from these respondents had to be removed before analysis. When coding it was determined that responses should be read three times. Initially we coded for individual terms or phrases, followed by concepts or components found in sentences or portions of the responses, and finally for general themes presented in the entire response. Despite being a tedious and time-consuming aspect of the data analysis phase, the coding was essential for developing an inclusive and wide-ranging list of sustainability components for the literacy survey.

Approximately 37.6% of respondents did not complete the literacy survey. Many of these individuals did not complete the SVO section, which was at the end of the survey. Therefore, data obtained form many of these individuals could not be included in the regression analysis.

Implications for Future Research

While the low response rates were assumed to indicate relative levels of interest in sustainability incorporation at SIU future research should strive to acquire a more diverse sample. Results that are more representative of the sample population would provide clearer picture of true levels of campus sustainability literacy. Furthermore, increasing the diversity of respondents should produce better results in the factor analysis and reliability tests of the SVO components since it was presumed that data came from this research was taken primarily from individuals with predominant biocentric values.

A completion rate of 62.4% may indicate that a streamlined version of the survey may be needed. Since this was the university's first attempt at a literacy survey we took an inclusive and exploratory approach when deciding which components should be included in the survey. Therefore nearly all the coded elements from the initial curriculum inventory were included in the literacy survey. Ultimately, intuitions should strive to develop literacy surveys that match their goals or mission statements regarding sustainability advancement.

A separate survey for staff members was not included in this study. However, obtaining more specific information from this demographic (i.e. department affiliation, occupation, perceived importance of sustainability) would assist in identifying operation aspects of the university (i.e. cafeteria staff, grounds maintenance, building operations, administrative departments) that are receptive to sustainability initiatives.

Adjusted R^2 values indicate that SVOs hold some predictive power over perceived importance of sustainability components; however, differing beta values when compared to other studies indicate that the nature of the relationship may vary between social groups or sample populations. Therefore, to be used as an effective tool in future sustainability literacy assessments or in future tests of the VBN theory, a value inventory must include an assessment of the nature of the relationship that the values hold over perceived importance. AASHE's STARS criteria do not suggest utilizing a perceived importance scale like the one used in this survey. However, this information could be useful for anticipating sustainability initiatives that are likely to be supported by the university community.

Future research of sustainable behaviors in higher education should also consider Ajzen's (1991) Theory of Planned Behavior. This model has been compared with the VBN theory in previous studies of environmentally responsible behavior. By examining a wide variety of potential influences on sustainable practices, researchers may customize a theoretical model that better suits predicting engagement in sustainable behaviors at higher education institutions.

In sum, this study documents that members of the SIU community, who are interested in sustainability enough to self-elect to respond to a campus literacy survey, perceive all sustainability components as important but do not possess substantial knowledge in all aspects of sustainability. Such discrepancies between reported sustainability literacy and perceived importance of sustainability warrants substantial efforts to integrate sustainability into the SIU curriculum and throughout campus operations.

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APPENDICES

Appendix A

Table A1. SIUC courses with sustainability content.

*List of Courses Reported By Department and Course Number or Name**				
ABE 204	CCJ 374	FOR/REC/AGRI 401	LAW 504	RT 383
ABE 419	CCJ 460	FOR 403	MATH 250	RT 461
ABE 450	CDS 594	FOR 405	MATH 251	SCI 210
AD 213	CHEM 273	FOR 409	MATH 322	SOC 108
AD 323	CHEM 434	FOR 420	MBMB 597	SOC 215
AD 363	CHEM 529	FOR 422	MEDP 403	SOC 526
AD 499	CI 120	FOR 423	MEDP 404	SOC 544
AGRI 300	CI 199	FOR 428	MGMT 350	SOC 572
AGSY 110	CI 220	FOR 431	MICR 301	SOM: Histology
AGSY 170	CI 312	FOR 470	MICR 481	SPCM 261
AGSY 314	CI 321	FOR 585	MKTG 305	SPCM 262
ANS 121	CI 435	GEOG 104	MKTG 363	SPCM 325
ANS 332	CI 503	GEOG 300	PHIL 104	SPCM 412
ANS 485	CI 544	GEOG 431	PHIL 310	SPCM 413
ANTH 104	CLAS 270	GEOG 439	PLB 117	SPCM 470
ANTH 405	DH 441	GEOG 480	PLB 438	SPCM 483
ANTH 430	ECON 567	GEOG 539	PLB 440	TRM 350
ANTH 480	ENGL 301	GEOL 122	PLB 471	TRM 450
ARC 242	EPSY 503	HED 334	PLB 524	TRM 451
ARC 351	EPSY 568	HND 100	PLSS 328	UHON 351
ARC 505	EPSY 575	HND 321	POLS 205	WED 460
ARCH 434	EPSY 576	IST 415	POLS 406	ZOOL 220
ARCH 451	FIN 361	JRNL 160	PSAS 405	ZOOL 407
ARCH 452	FIN 463	JRNL 301	PSAS 590	ZOOL 409
ARCH 500	FN 360	JRNL 302	PSAS/PLSS 200	ZOOL 415
ASFN 314	FN 574	JRNL 305	PSAS/PLSS 240	ZOOL 433
ASFN 315	FOR 201	JRNL 310	PSAS/PLSS 420	ZOOL 440
AUT 108	FOR 220	JRNL 332	PSAS/PLSS 428	ZOOL 464
AUT 120	FOR 285	JRNL 360	PSAS/PLSS 429	ZOOL 477
AUT 170	FOR 310	KIN 210	PSAS/PLSS 446	ZOOL 478
AUT 280	FOR 325	KIN 345	PSYC 432	ZOOL 565
BIOL 307	FOR 331	LAW 503	RT 365	

** This list does not include multiple sections listed for each class and two classes from the School of Medicine that were reported without enough information to determine course titles or numbers.*

Appendix B

Table B1. Sustainability components.

Sustainability Components Listed by Group					
Cultural Systems	**Integrated Systematic Integrity**	**Ecological Systems**	**Food Systems**	**Individual Integrity**	**Energy Systems**
Bioregionalism	Biomimicry	Atmospheric systems	Biodynamic agriculture	Civic engagement	Efficiency accounting
Cultural ecocriticism	Environmental Economics	Biodiversity	Biointensive farming	Eco-philosophy	Energy efficient technology
Environmental art	Environmental engineering	Resource geography	Grass farming	Environmental ethics	Renewable energy sources
Environmental media	Environmental governance	Earth's geologic systems	Integrated farming systems	Social justice	
Environmental rhetoric	Environmental justice	Ecology	Permaculture	Social responsibility	
Green business strategies	Environmental law	Ecotoxicology			
Green consumerism	Environmental Policy	Environmental conservation			
Human health	Human-ecological systems management	Environmental preservation			
Literary ecocriticism	Precautionary principle				
Participatory democracy	Resource consumption				
Population demographics	Smart growth				
Transportation planning decision-making	Sustainable architecture				

Appendix C

Table C1. Mean knowledge and perceived importance of individual integrity items.*

Sustainability Component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Civic engagement	1600	3.02	1.41	1439	4.98	1.44
Students	1004	2.93[a]	1.44	883	4.91[a]	1.51
Staff	401	3.16[a]	1.30	374	5.14[a]	1.25
Faculty	180	3.17	1.40	168	4.97	1.37
Eco-philosophy	1596	2.57	1.45	1301	4.47	1.51
Students	1003	2.60	1.50	817	4.43	1.58
Staff	398	2.50	1.32	322	4.65	1.35
Faculty	180	2.51	1.41	148	4.33	1.38
Environmental ethics	1594	3.67	1.35	1528	5.26	1.36
Students	1004	3.74[a]	1.40	957	5.24	1.42
Staff	396	3.54[a]	1.22	388	5.35	1.25
Faculty	179	3.56	1.28	169	5.12	1.18
Social justice	1595	3.69	1.40	1499	5.09	1.45
Students	1002	3.72	1.46	948	5.10	1.49
Staff	398	3.61	1.25	370	5.14	1.31
Faculty	180	3.72	1.40	167	4.92	1.44
Social responsibility	1596	4.24	1.28	1547	5.68	1.29
Students	1003	4.34[ab]	1.34	973	5.70	1.34
Staff	398	4.07[a]	1.13	388	5.68	1.18
Faculty	180	4.08[b]	1.22	172	5.56	1.26

*Demographic groups within individual components that contain identical superscripts have significantly different means at p=0.05.

Appendix C

Table C2. Mean knowledge and perceived importance of integrated systematic integrity items.*

Sustainability Component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Biomimicry	1302	1.69	1.19	523	3.77	1.58
Students	823	1.71	1.24	363	3.76	1.59
Staff	319	1.55	1.07	102	4.05[a]	1.49
Faculty	150	1.71	1.19	54	3.39[a]	1.53
Environmental economics	1300	2.57	1.34	1013	4.62	1.41
Students	822	2.60	1.38	646	4.54	1.47
Staff	317	2.49	1.22	246	4.78	1.26
Faculty	150	2.53	1.35	114	4.75	1.36
Environmental engineering	1299	2.37	1.34	1019	4.66	1.40
Students	821	2.37	1.39	643	4.57[a]	1.47
Staff	317	2.38	1.28	250	4.85[a]	1.23
Faculty	150	2.33	1.22	119	4.76	1.27
Environmental governance	1299	2.31	1.32	949	4.55	1.51
Students	823	2.35	1.35	616	4.48	1.58
Staff	316	2.22	1.23	225	4.68	1.32
Faculty	150	2.28	1.38	103	4.73	1.50
Environmental justice	1297	2.47	1.34	991	4.57	1.55
Students	821	2.49	1.37	637	4.49	1.63
Staff	316	2.34	1.23	237	4.74	1.33
Faculty	150	2.62	1.39	111	4.67	1.51
Environmental law	1298	2.47	1.30	1059	4.73	1.48
Students	822	2.49	1.33	676	4.60[a]	1.57
Staff	316	2.37	1.20	225	4.98[a]	1.28
Faculty	150	2.51	1.36	122	4.89	1.25
Environmental policy	1299	2.77	1.36	1099	4.99	1.44
Students	822	2.77	1.37	694	4.89[ab]	1.54
Staff	317	2.68	1.26	266	5.14[a]	1.24
Faculty	150	2.97	1.43	131	5.21[b]	1.14

Sustainability Component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Human-ecological systems management	1297	2.36	1.38	940	4.85	1.48
Students	821	2.46[a]	1.42	605	4.80	1.56
Staff	316	2.14[a]	1.21	218	5.01	1.25
Faculty	150	2.33	1.41	110	4.89	1.36
Precautionary principle	1296	1.88	1.36	622	4.43	1.62
Students	820	1.99[a]	1.40	434	4.46	1.64
Staff	317	1.65[a]	1.21	127	4.46	1.55
Faculty	149	1.78	1.39	57	4.21	1.54
Resource consumption	1297	3.25	1.45	1133	5.41	1.42
Students	821	3.33[a]	1.48	719	5.36	1.54
Staff	316	3.06[a]	1.37	276	5.51	1.18
Faculty	150	3.19	1.42	130	5.56	1.11
Smart growth	1297	2.51	1.45	923	5.14	1.47
Students	823	2.58[a]	1.49	591	5.11	1.56
Staff	314	2.29[a]	1.34	216	5.17	1.32
Faculty	150	2.61	1.44	111	5.22	1.29
Sustainable architecture	1295	2.65	1.42	1050	5.05	1.47
Students	821	2.72[a]	1.49	671	5.03	1.57
Staff	314	2.46[a]	1.34	250	5.14	1.26
Faculty	150	2.64	1.32	120	5.04	1.24

*Demographic groups within individual components that contain identical superscripts have significantly different means at p=0.05.

Appendix C

Table C3. Mean knowledge and perceived importance of ecological systems items.*

Sustainability Component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Atmospheric systems	1195	2.36	1.34	856	4.40	1.58
Students	754	2.42	1.35	543	4.33	1.66
Staff	292	2.22	1.27	211	4.55	1.43
Faculty	139	2.32	1.39	95	4.48	1.39
Biodiversity	1194	2.91	1.57	949	4.70	1.56
Students	753	3.10[a]	1.61	613	4.66	1.63
Staff	292	2.43[ab]	1.37	216	4.79	1.43
Faculty	139	2.96[b]	1.53	112	4.80	1.41
Resource geography	1192	2.34	1.40	818	4.51	1.43
Students	752	2.47[a]	1.41	544	4.48	1.49
Staff	292	2.06[a]	1.27	188	4.63	1.29
Faculty	138	2.26	1.45	80	4.46	1.39
Earth's geologic systems	1192	2.63	1.33	908	4.38	1.51
Students	752	2.71	1.36	580	4.38	1.57
Staff	292	2.51	1.25	224	4.49	1.34
Faculty	138	2.43	1.27	97	4.18	1.49
Ecology	1193	3.00	1.46	1005	4.90	1.46
Students	753	3.05[a]	1.51	634	4.81[a]	1.54
Staff	292	2.77[ab]	1.25	247	5.10[a]	1.29
Faculty	138	3.25[b]	1.54	116	5.04	1.28
Ecotoxicology	1191	2.08	1.27	777	4.78	1.55
Students	751	2.14	1.30	496	4.66[a]	1.61
Staff	292	1.93	1.19	185	5.05[a]	1.36
Faculty	138	2.06	1.26	90	4.86	1.51
Environmental conservation	1194	3.54	1.42	1095	5.45	1.36
Students	754	3.64[a]	1.45	696	5.42	1.43
Staff	292	3.34[a]	1.26	268	5.51	1.26
Faculty	138	3.44	1.53	123	5.53	1.12
Environmental preservation	1194	3.50	1.40	1092	5.42	1.39
Students	754	3.62[a]	1.45	695	5.40	1.43
Staff	292	3.25[a]	1.20	265	5.54	1.32
Faculty	138	3.42	1.45	124	5.31	1.28

*Demographic groups within individual components that contain identical superscripts have significantly different means at p=0.05.

Appendix C

Table C4. Mean knowledge and perceived importance of cultural systems items.*

Sustainability Component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Bioregionalism	1088	1.70	1.19	501	3.97	1.61
Students	682	1.73	1.22	321	3.93	1.63
Staff	270	1.58	1.05	116	4.04	1.49
Faculty	126	1.79	1.29	62	4.11	1.72
Cultural ecocriticism	1087	1.68	1.19	481	3.85	1.59
Students	681	1.83[ab]	1.29	335	3.91	1.61
Staff	270	1.40[a]	0.88	93	3.77	1.56
Faculty	126	1.49[b]	1.04	50	3.68	1.53
Environmental art	1087	2.06	1.30	711	3.27	1.54
Students	681	2.14[a]	1.34	453	3.34	1.62
Staff	270	1.88[a]	1.13	172	3.17	1.36
Faculty	126	2.04	1.41	79	3.14	1.48
Environmental media	1088	2.22	1.32	761	3.89	1.52
Students	682	2.31[a]	1.35	484	3.93	1.58
Staff	270	2.02[a]	1.23	189	3.84	1.39
Faculty	126	2.19	1.39	82	3.87	1.45
Environmental rhetoric	1086	2.13	1.36	686	3.71	1.66
Students	680	2.22[a]	1.41	439	3.73	1.71
Staff	270	1.92[a]	1.15	167	3.64	1.55
Faculty	126	2.13	1.39	74	3.81	1.58
Green business strategies	1089	2.74	1.34	936	4.86	1.50
Students	683	2.82	1.41	580	4.78[a]	1.60
Staff	270	2.63	1.24	239	5.11[a]	1.32
Faculty	126	2.52	1.14	110	4.75	1.30
Green consumerism	1087	3.07	1.43	942	4.95	1.50
Students	681	3.13	1.50	586	4.85[a]	1.57
Staff	270	2.99	1.28	240	5.17[a]	1.35
Faculty	126	2.98	1.33	109	5.03	1.39
Human health	1090	3.78	1.44	978	5.54	1.39
Students	684	3.85	1.46	617	5.50	1.45
Staff	270	3.71	1.35	240	5.73	1.20
Faculty	126	3.63	1.44	113	5.42	1.34

Sustainability Component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Literary ecocriticism	1086	1.70	1.16	527	3.73	1.60
Students	680	1.83[ab]	1.25	361	3.77	1.61
Staff	270	1.47[a]	0.94	114	3.75	1.58
Faculty	126	1.51[b]	1.03	49	3.39	1.55
Participatory democracy	1086	2.99	1.66	816	4.93	1.56
Students	680	2.92[a]	1.70	504	4.81[a]	1.64
Staff	270	3.01	1.56	204	5.15[a]	1.40
Faculty	126	3.39[a]	1.59	102	5.04	1.44
Population demographics	1087	3.14	1.47	905	4.50	1.49
Students	681	3.17	1.54	563	4.42[a]	1.56
Staff	270	3.08	1.34	230	4.75[a]	1.32
Faculty	126	3.14	1.38	104	4.43	1.37
Transportation planning decision-making	1088	2.69	1.46	907	5.00	1.45
Students	681	2.81[ab]	1.54	561	4.96	1.51
Staff	271	2.51[a]	1.28	226	5.12	1.31
Faculty	126	2.42[b]	1.38	112	5.04	1.40

*Demographic groups within individual components that contain identical superscripts have significantly different means at p=0.05.

Appendix C

Table C5. Mean knowledge and perceived importance of energy systems items.*

Sustainability Component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Efficiency accounting	1094	1.91	1.29	680	4.81	1.57
Students	685	1.96	1.33	421	4.71	1.62
Staff	272	1.89	1.23	178	5.02	1.48
Faculty	127	1.73	1.14	75	4.89	1.46
Energy efficient technology	1097	2.98	1.44	980	5.52	1.35
Students	688	3.11[ab]	1.50	614	5.50	1.40
Staff	272	2.82[a]	1.31	248	5.64	1.25
Faculty	127	2.69[b]	1.33	110	5.48	1.23
Renewable energy sources	1100	3.53	1.36	1045	5.80	1.34
Students	691	3.67[a]	1.39	658	5.79	1.41
Staff	272	3.22[a]	1.27	261	5.90	1.20
Faculty	127	3.44	1.27	117	5.73	1.25

*Demographic groups within individual components that contain identical superscripts have significantly different means at p=0.05.

Appendix C

Table C6. Mean knowledge and perceived importance of food systems items.*

Sustainability Component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Biodynamic agriculture	1082	1.80	1.27	547	4.33	1.54
Students	676	1.89[a]	1.30	371	4.20[a]	1.53
Staff	270	1.64[a]	1.64	116	4.72[a]	1.51
Faculty	126	1.65	1.25	56	4.38	1.58
Biointensive farming	1084	1.83	1.25	562	4.27	1.57
Students	677	1.88	1.28	369	4.16[a]	1.61
Staff	271	1.69	1.14	118	4.65[a]	1.45
Faculty	126	1.86	1.28	69	4.23	1.47
Grass farming	1085	1.96	1.29	589	4.16	1.55
Students	678	2.00	1.32	382	4.07	1.57
Staff	271	1.83	1.14	139	4.41	1.50
Faculty	126	2.01	1.41	64	4.22	1.50
Integrated farming systems	1083	1.99	1.31	611	4.51	1.56
Students	676	2.05[a]	1.35	394	4.38[a]	1.60
Staff	271	1.79[a]	1.12	134	4.84[a]	1.42
Faculty	126	2.12	1.41	76	4.62	1.51
Permaculture	1081	1.67	1.20	441	4.25	1.66
Students	675	1.72	1.26	289	4.18	1.67
Staff	271	1.54	1.03	94	4.50	1.61
Faculty	125	1.67	1.20	53	4.30	1.69

*Demographic groups within individual components that contain identical superscripts have significantly different means at p=0.05.

Appendix C

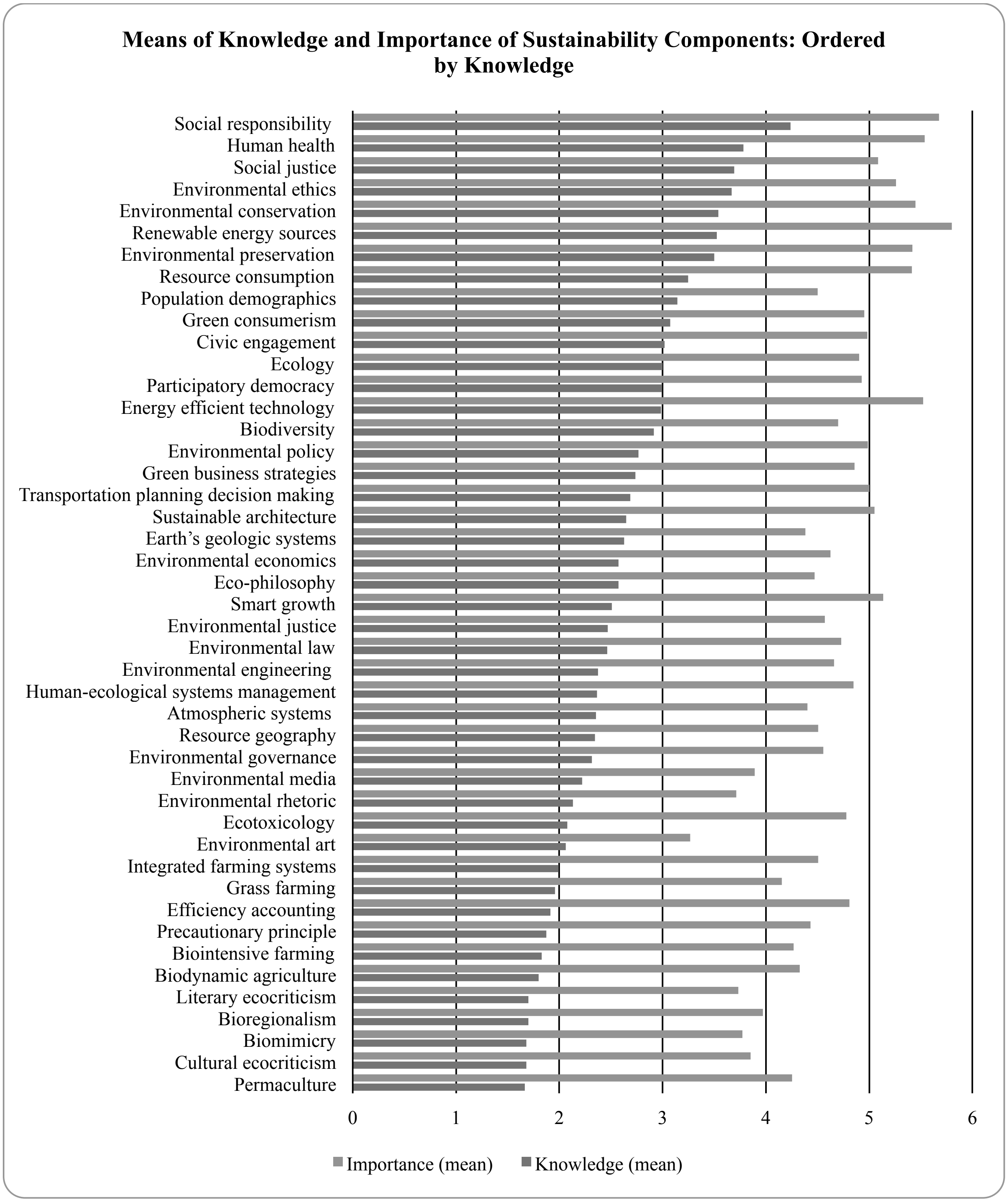

Figure C1. Mean scores of SIUC community's knowledge and importance of sustainability components ordered by knowledge (0 = not at all knowledgeable/important & 6 = I am an expert/essential).

Appendix C

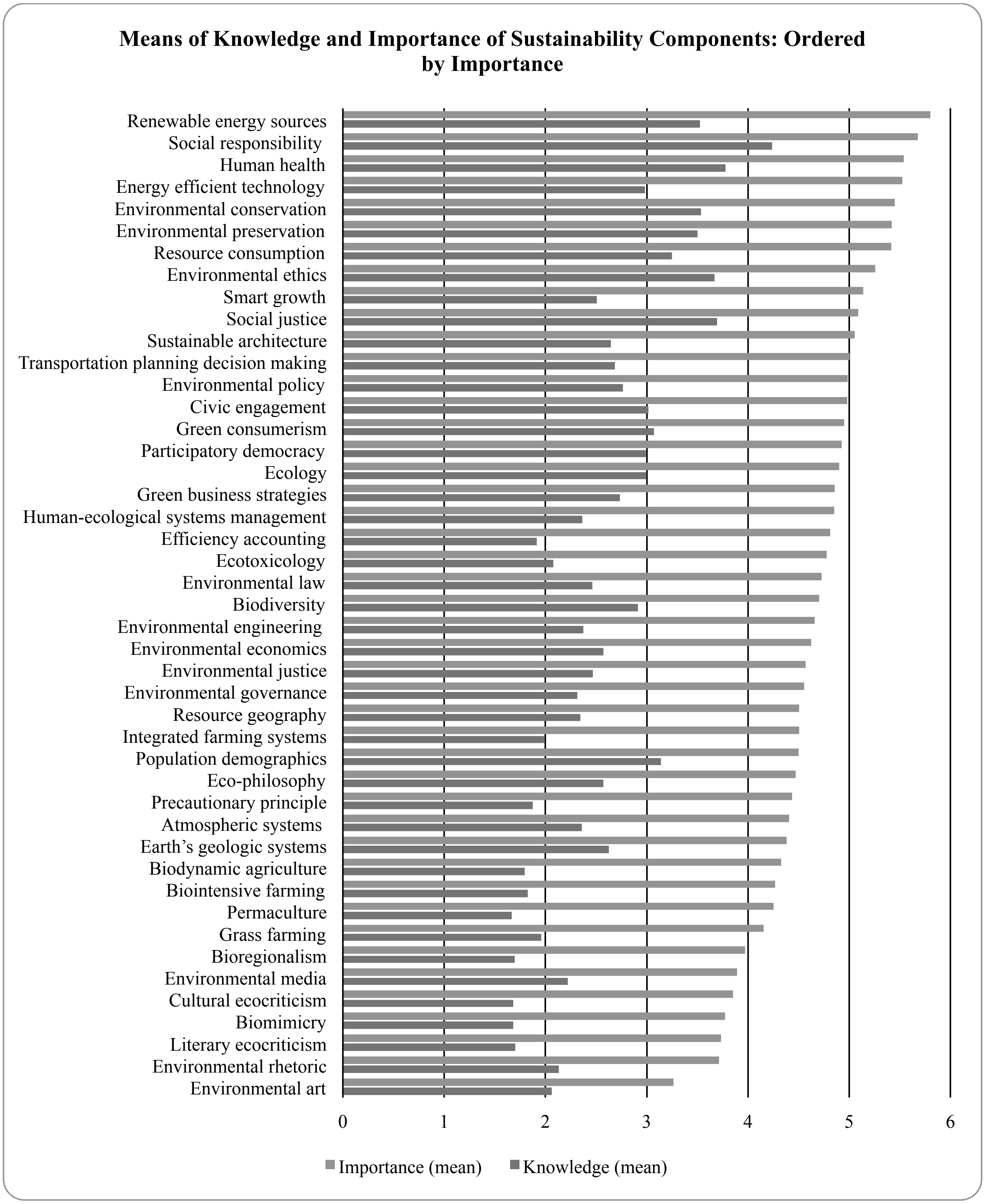

Figure C2. Mean scores of SIUC community's knowledge and importance of sustainability components ordered by importance (0 = not at all knowledgeable/important & 6 = I am an expert/essential).

Appendix D

Table D1. Mean knowledge and perceived importance of grouped sustainability components.*

Grouped sustainability component	Knowledge			Importance		
	n	Mean	Standard deviation	n	Mean	Standard deviation
Individual integrity	1577	3.44	1.09	1219	5.10	1.17
Student	1002	3.47	1.12	768	5.07	1.22
Staff	396	3.37	1.02	307	5.23	1.05
Faculty	179	3.41	1.08	144	4.98	1.08
Integrated systems management	1276	2.44	1.05	400	4.56	1.38
Student	818	2.49[a]	1.07	288	4.50	1.45
Staff	309	2.30[a]	0.99	74	4.70	1.15
Faculty	149	2.45	1.04	38	4.80	1.24
Ecological systems	1180	2.80	1.15	603	4.82	1.31
Student	750	2.90[a]	1.16	398	4.75	1.37
Staff	292	2.56[a]	1.05	141	4.98	1.19
Faculty	138	2.77	1.19	64	4.88	1.07
Cultural systems	1072	2.50	0.98	246	4.20	1.37
Student	676	2.57[a]	1.03	68	4.38	1.17
Staff	270	2.35[a]	0.86	36	4.36	1.17
Faculty	126	2.44	0.89	350	4.25	1.32
Energy systems	1083	2.81	1.16	666	5.35	1.30
Student	684	2.90[ab]	1.19	416	5.29	1.35
Staff	272	2.65[a]	1.10	177	5.51	1.20
Faculty	127	2.62[b]	1.04	73	5.33	1.19
Food systems	1070	1.85	1.11	372	4.22	1.54
Student	675	1.91[a]	1.15	82	4.59[a]	1.46
Staff	270	1.69[a]	0.98	41	4.26[a]	1.57
Faculty	125	1.87	1.16	249	4.09	1.55

*Demographic groups within individual components that contain identical superscripts have significantly different means at p=0.05.

Appendix D

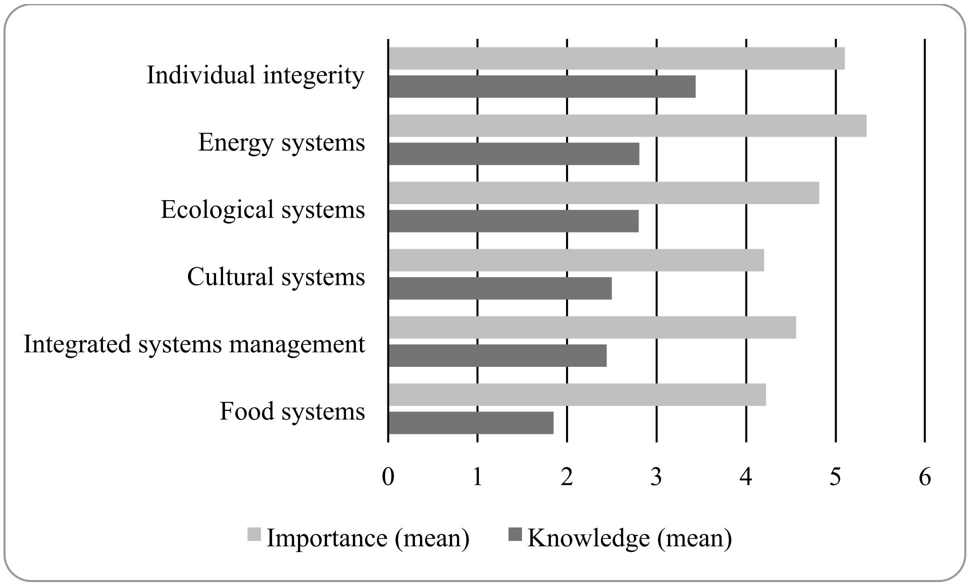

Figure D1. Mean scores of SIUC community's knowledge and importance of grouped sustainability components ordered by knowledge (0 = not at all knowledgeable/important & 6 = I am an expert/essential).

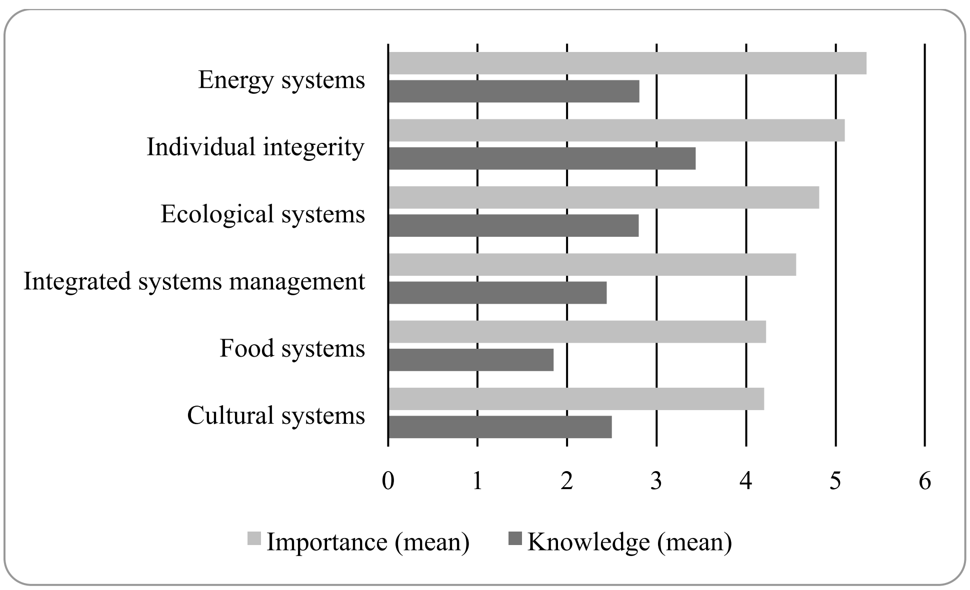

Figure D2. Mean scores of SIUC community's knowledge and importance of grouped sustainability components ordered by importance (0 = not at all knowledgeable/important & 6 = I am an expert/essential).

Appendix E

Table E1. Social value orientation clusters.

Social Value Orientation Clusters
Altruism
Social justice, correcting injustice, care for the weak.
Equality, equal opportunity for all.
Harmony among people.
Biocentrism
Protecting the environment, preserving nature.
Unity with nature, fitting into nature.
Respecting the earth, harmony with other species.
Egocentrism
Influential, having an impact on people and events.
Wealth, material possessions, money.
Authority, the right to lead or command.
Traditionalism
Family security, safety for loved ones.
Honoring parents and elders, showing respect.
Self-discipline, self-restraint, resistance to temptation.

Appendix F

Table F1. Stepwise regression of value orientations on knowledge of grouped sustainability components.

		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Individual Integrity: Knowledge	Model 1	BIO	0.062	0.061	0.248	8.447	0.000
	Model 2	BIO	0.076	0.074	0.248	8.510	0.000
		ALT			0.119	4.082	0.000
	Model 3	BIO	0.081	0.078	0.248	8.528	0.000
		ALT			0.119	4.093	0.000
		TRAD			0.070	2.411	0.016
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Integrated Systematic Integrity: Knowledge	Model 1	BIO	0.057	0.056	0.238	8.041	0.000
	Model 2	BIO	0.072	0.070	0.239	8.140	0.000
		EGO			0.124	4.205	0.000
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Eco Sys: Knowledge	Model 1	BIO	0.081	0.080	0.285	9.749	0.000
	Model 2	BIO	0.092	0.090	0.284	9.785	0.000
		ALT			-0.104	-3.592	0.000
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Cultural Systems: Knowledge	Model 1	BIO	0.049	0.048	0.221	7.385	0.000
	Model 2	BIO	0.061	0.059	0.222	7.451	0.000
		EGO			0.111	3.718	0.000
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Energy Systems: Knowledge	Model 1	EGO	0.023	0.022	0.152	5.044	0.000
	Model 2	EGO	0.040	0.038	0.153	5.096	0.000
		BIO			0.129	4.309	0.000
	Model 3	EGO	0.044	0.041	0.153	5.104	0.000
		BIO			0.129	4.305	0.000
		ALT			-0.061	-2.024	0.043
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Food Systems: Knowledge	Model 1	BIO	0.027	0.026	0.165	5.462	0.000
	Model 2	BIO	0.036	0.034	0.164	5.449	0.000
		ALT			-0.093	-3.077	0.002
	Model 3	BIO	0.042	0.039	0.165	5.486	0.000
		ALT			-0.093	-3.080	0.002
		EGO			0.076	2.524	0.012

Appendix F

Table F2. Stepwise regression of value orientations on importance of grouped sustainability components.

		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Individual Integrity: Importance	Model 1	BIO	0.228	0.227	0.478	15.755	0.000
	Model 2	BIO	0.366	0.364	0.464	16.857	0.000
		ALT			0.371	13.502	0.000
	Model 3	BIO	0.398	0.396	0.460	17.150	0.000
		ALT			0.363	13.534	0.000
		TRD			0.180	6.721	0.000
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Integrated Systematic Integrity: Importance	Model 1	BIO	0.316	0.314	0.562	12.187	0.000
	Model 2	BIO	0.360	0.360	0.542	12.132	0.000
		ALT			0.222	4.958	0.000
	Model 3	BIO	0.377	0.371	0.503	11.898	0.000
		ALT			0.198	4.381	0.000
		TRD			0.115	2.539	0.012
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Ecologic Systems: Importance	Model 1	BIO	0.263	0.261	0.512	13.956	0.000
	Model 2	BIO	0.331	0.329	0.506	14.447	0.000
		ALT			0.262	7.495	0.000
	Model 3	BIO	0.356	0.352	0.491	14.215	0.000
		ALT			0.246	7.122	0.000
		TRD			0.158	4.548	0.000
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Cultural Systems: Importance	Model 1	BIO	0.328	0.326	0.573	12.922	0.000
	Model 2	BIO	0.425	0.422	0.528	12.718	0.000
		ALT			0.315	7.582	0.000
	Model 3	BIO	0.442	0.437	0.509	12.324	0.000
		ALT			0.291	6.996	0.000
		TRD			0.134	3.203	0.001
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Energy Systems: Importance	Model 1	BIO	0.173	0.172	0.416	11.723	0.000
	Model 2	BIO	0.239	0.237	0.404	11.848	0.000
		ALT			0.257	7.519	0.000
	Model 3	BIO	0.269	0.266	0.398	11.876	0.000
		ALT			0.238	7.066	0.000
		TRD			0.175	5.191	0.000
		Predictors	R^2	Adj R^2	Beta	t-statistic	sig.
Food Systems: Importance	Model 1	BIO	0.241	0.239	0.491	10.803	0.000
	Model 2	BIO	0.287	0.283	0.465	10.458	0.000
		ALT			0.216	4.848	0.000
	Model 3	BIO	0.302	0.296	0.458	10.386	0.000
		ALT			0.190	4.227	0.000
		TRD			0.123	2.753	0.006

Appendix G

SECTION 1: Sustainability Literacy and Sustainable Practices

Please answer all questions that apply to you.

* 1. Please rate the level of sustainable literacy that the following groups possess (please select a button on the scale from "not at all literate" to "extremely literate")?

	Not at all literate	Slightly literate	Somewhat literate	Very literate	Extremely literate
a) SIUC students					
b) SIUC faculty and instructors					
c) Yourself					

* 2. Please define "sustainability" in your own words.

* 3. What criteria are essential to your definition of "sustainability"?

* 4. How important is an interdisciplinary or holistic approach to the following categories (please select a button on the scale from not "not at all important" to "extremely important")?

	Not at all important	Slightly important	Somewhat important	Very important	Extremely important
a) Sustainability education					
b) Sustainable practices					

* 5. To what extent has sustainability been integrated into the following categories (please select a button on the scale from "not at all integrated" to "extremely integrated")?

	Not at all integrated	Slightly integrated	Somewhat integrated	Very integrated	Extremely integrated
a) University core curriculum					
b) Your college					
c) Your department					
d) Your specialization or program					
e) University operations					

* 6. Which subject areas related to the environment and/or sustainability are underrepresented in the University's curriculum?

Appendix G

* 7. To what extent are students exposed to sustainability through hands-on engagement with the following mediums (please select a button on the scale from "not at all exposed" to "extremely exposed")?

	Not at all exposed	Slightly exposed	Somewhat exposed	Substantially exposed	Extremely exposed
a) Engagement with social communities of southern Illinois	○	○	○	○	○
b) Engagement with the natural environments of southern Illinois	○	○	○	○	○
c) Co-curricular learning with businesses, governmental organizations and programs, or community based institutions	○	○	○	○	○

* 8. Do you instruct any courses at SIUC?

○ yes

○ no

Appendix G

SECTION 2: Curriculum Content

Please complete a separate version of this section for each class that you instruct.

* 1. Please provide the following course information

Dept. code

Course #

Sect. #

* 2. Brief description of the themes or goals of the course:

3. If applicable, please give a definition or list of criteria that best describes "sustainability" as it relates to this course:

4. If applicable, please list any University operations investigated in this course (e.g. University recycling procedures):

5. If applicable, please list any field experiences offered during this course:

6. If applicable, please list any co-curricular (service) learning projects required in this course:

7. If applicable, please list topics related to natural environments or sustainable education explored in this class that are specific to the southern Illinois region (e.g. The Shawnee National Forest, coal use, etc.)?

* 8. If you instruct another class please chose "add additional class". If you have filled out a version of SECTION 2 for all the classes you instruct please click "continue to next section".

- Add additional class
- Continue to next section

Appendix G

SECTION 3: Sustainable SIUC

Please answer all questions that apply to you.

*** 1. What is your title?**

- Instructor
- Adjunct Faculty
- Assistant Professor
- Associate Professor
- Professor
- Emeritus Professor
- Other (please specify)

*** 2. Would you be interested in learning strategies to incorporate sustainability into your courses?**

- Yes
- No
- N/A

*** 3. Would you be interested in learning strategies to incorporate sustainability into campus operations?**

- Yes
- No

4. If you answered "yes" to either of the previous two questions, please rate your level of interest in the following types of opportunities.

	Not at all interested	Slightly interested	Somewhat interested	Very interested	Extremely interested
a) Seminar series					
b) Workshop series					
c) Book club					

Other (please specify)

5. If you would be interested in serving on the Chancellor's Sustainability Council working curriculum committee, please provide your e-mail address or alternate contact information?

Appendix G

6. Please use the space below for your questions or comments.

Appendix H

1.

The Sustainability Council at SIUC uses the following definition, taken from the Association of University Leaders for a Sustainable Future, to guide its mission:

Sustainability implies that the critical activities of a higher education institution are ecologically sound, socially just and economically viable, and that they will continue to be so for future generations. A truly sustainable college or university would emphasize these concepts in its curriculum and research, preparing students to contribute as working citizens to an environmentally healthy and equitable society. The institution would function as a sustainable community, embodying responsible consumption of energy, water, and food, and supporting sustainable development in its local community and region.

Currently the Sustainability Council is in the process of gauging the literacy of the faculty, staff and students on specific issues related to the sustainability concept. This survey is a part of the Sustainability Tracking, Assessment, and Rating System (STARS). The system is used by the Association for the Advancement of Sustainability in Higher Education as a way for universities to monitor their progress toward more sustainable practices.

Furthermore, the results of this assessment are intended to assist the Sustainability Council in the targeting of curriculum initiatives, faculty development workshops, and staff outreach that aim to increase campus sustainability literacy.

1. Which of the following best represents your role at SIUC?

- ◯ Undergraduate student
- ◯ Master's student
- ◯ Doctoral student
- ◯ Staff (civil service)
- ◯ Faculty

Other (please specify)

2. With which department or unit are you primarily associated? (Respond "none" if you are an undecided student)

3. List any other secondary departments or units whit which you are associated.

4. Use the definition below to complete the rating scales in this question.

	How closely does this definiton of sustainability relate to your own?	Based on the given definition how literate would you consider yourself to be on the concept of sustainability?
Sustainability is a transdisciplinary approach to ecological systems, cultural systems, energy systems, and food systems, with integrity of individuals and all systems as the goal.		

The text boxes below are the answer choices that respondents could have chosen from for the last question on this page.

Not at all	Not at all literate
Slightly related	Slightly literate
Somewhat related	Somewhat literate
Moderately related	Moderately literate
Very close	Very literate
Extremely accurate	Extremely literate
Exact	Expert

Appendix H

2. Individual Integrity

Questions on this page are related to the broader idea of "individual integrity". A basic definition of individual integrity is: a firm adherence to a code of morals.

1. Please rate the following concepts for the following categories.

	How knowlegable are you on this concept as it relates to sustainable practices?	How important is this concept to a sustainable university community?
Civic engagement		
Environmental ethics		
Social justice		
Social responsibility		

The text boxes below are the answer choices that respondents could have chosen from for the remainder of the questions on the survey with drop down menus.

Not at all knowledgeable	Not important
Slightly knowledgeable	Low importance
Somewhat knowledgeable	Somewhat important
Moderately knowledgeable	Moderately important
Very knowledgeable	Very important
Extremely knowledgeable	Extremely important
I am an expert	Essential
	Don't know

Appendix H

3. Integrated Systematic Integrity

Questions on this page are related to the broader idea of "integrated systematic integrity". A basic definition of integrated systematic integrity is: having properly functioning economic, social and political components in a society.

1. Please rate the following concepts for the following categories

	How knowlegable are you on this concept as it relates to sustainable practices?	How important is this concept to a sustainable university community?
Environmental economics		
Environmental engineering		
Environmental governance		
Environmental justice		
Environmental law		
Environmental policy		
Human-ecological systems management		
Precautionary principle		
Resource consumption		
Smart growth		
Sustainable architecture		

Appendix H

4. Eoclogical Systems

Questions on this page are related to the broader idea of "ecological systems". A basic definition of ecological systems is: systems that depend on the interaction of two or more organisms as well as the occurrence of natural processes to maintain their functionality and identity.

1. Please rate the following concepts for the following categories

	How knowlegable are you on this concept as it relates to sustainable practices?	How important is this concept to a sustainable university community?
Atmospheric systems		
Biodiversity		
Earth's geography		
Earth's geologic systems		
Earth's hydraulic systems		
Ecology		
Ecotoxicology		
Environmental conservation		
Environmental preservation		

Appendix H

5. Cultural Systems

Questions on this page are related to the broader idea of "cultural systems". A basic definition of cultural systems is: the customary beliefs, material traits, and social forms of a racial, religious, or social group.

1. Please rate the following concepts for the following categories

	How knowlegable are you on this concept as it relates to sustainable practices?	How important is this concept to a sustainable university community?
Biomimicry		
Bioregionalism		
Environmental rhetoric		
Green business strategies		
Green consumerism		
Human health		
Participatory democracy		
Population demographics		
Transportation planning decision-making (TDM)		

Appendix H

6. Energy Systems

Questions on this page are related to the broader idea of "energy systems". A basic definition of energy systems is: human-made methods for processing and using energy.

1. Please rate the following concepts for the following categories

	How knowlegable are you on this concept as it relates to sustainable practices?	How important is this concept to a sustainable university community?
Efficiency accounting		
Energy efficiency technology		
Renewable energy sources		

Appendix H

7. Food Systems

Questions on this page are related to the broader idea of "food systems". A basic definition of food systems is: the ways in which humans procure and distribute food.

1. Please rate the following concepts for the following categories

	How knowlegable are you on this concept as it relates to sustainable practices?	How important is this concept to a sustainable university community?
Biodynamic agriculture		
Biointensive farming		
Grass farming		
Integrated farming systems		
Permaculture		

Appendix H

8. Information About You

The demographic information collected in this section will be used to help us better understand who has completed the survey. By comparing the response trends of demographic groups we hope to explore any potential ways in which sustainability literacy differs among these groups.

1. Using the following scale please indicate how important each statement is as a guiding principle in YOUR life. Please place your response in the space provided to the right of each statement. If you are opposed to the statement, please mark "opposed".

	Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important	Essential	Opposed
Family security, safety for loved ones.	◯	◯	◯	◯	◯	◯	◯	◯
Protecting the environment, preserving nature.	◯	◯	◯	◯	◯	◯	◯	◯
Honoring parents and elders, showing respect.	◯	◯	◯	◯	◯	◯	◯	◯
Social justice, correcting injustice, care for the weak.	◯	◯	◯	◯	◯	◯	◯	◯
Self-discipline, self-restraint, resistance to temptation.	◯	◯	◯	◯	◯	◯	◯	◯
Unity with nature, fitting into nature.	◯	◯	◯	◯	◯	◯	◯	◯
Influential, having an impact on people and events.	◯	◯	◯	◯	◯	◯	◯	◯
Respecting the earth, harmony with other species.	◯	◯	◯	◯	◯	◯	◯	◯
Equality, equal opportunity for all.	◯	◯	◯	◯	◯	◯	◯	◯
Wealth, material possessions, money.	◯	◯	◯	◯	◯	◯	◯	◯
Harmony among people.	◯	◯	◯	◯	◯	◯	◯	◯
Authority, the right to lead or command.	◯	◯	◯	◯	◯	◯	◯	◯

2. Gender

◯ Male

◯ Female

3. What is your birth year? (YYYY)

4. What is the highest level of education that you have obtained?

◯ GED or High school diploma

◯ Associates Degree

◯ Some college

◯ Bachelor's degree

◯ Master's degree

◯ Doctorate

Other (please specify)

Appendix H

9.

1. Thank you for completing the survey. If you would like to enter a raffle to win one of three $50 gift cards to Barnes and Noble please enter your e-mail address below. E-mail addresses will be selected at random after the survey has been closed. E-mail addresses will be stored in a separate file from your responses in order to ensure confidentiality; this file will be destroyed immediately following the raffle.

VITA

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University of Oregon
Bachelor of Science, Environmental Studies, June 2003

Thesis Title:

Sustainability Curriculum Inventory and Literacy Assessment; The Influence of Values on Knowledge of and Perceived Importance of Sustainability Components

Major Professor: Erin Seekamp, Andrew Carver