

INVESTIGATING SUSTAINABILITY LITERACY AT SOUTHERN ILLINOIS  
UNIVERSITY CARBONDALE USING THE ASSESSMENT OF SUSTAINABILITY  
KNOWLEDGE (ASK) SCALE

by

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A Thesis

Submitted in Partial Fulfillment of the Requirements for the  
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THESIS APPROVAL

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for the Degree of

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in the field of Geography and Environmental Resources

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## AN ABSTRACT OF THE THESIS OF

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TITLE: INVESTIGATING SUSTAINABILITY LITERACY AT SOUTHERN ILLINOIS UNIVERSITY CARBONDALE USING THE ASSESSMENT OF SUSTAINABILITY KNOWLEDGE (ASK) SCALE

MAJOR PROFESSOR: Dr. Leslie A. Duram

This research investigates how the ASK (Assessment of Sustainability Knowledge) Scale, developed by Zwickle and Jones (2018), can be used to assess the current state of sustainability knowledge at Southern Illinois University Carbondale (SIUC). The goal of this research is to identify an assessment process that is efficient and meaningful for SIUC in future planning and programming. To answer the research questions, students were surveyed online in Spring 2020 using the ASK Scale survey. The survey consisted of all 12 unaltered questions from the ASK Scale, in addition to questions about participant's year in school and major. The questions from the survey were analyzed using Microsoft Excel to find the results. This study found that the average ASK score among students at SIUC is 8.61 (out of 12.00), which shows that students who took this survey do possess a relatively high sustainability literacy. The results show that students at SIUC have the highest understanding of the social domain of sustainability (average score 84.63%), followed by the environmental domain (average score 74.11%), while the economic domain was the lowest (average score 59.17%). This shows that SIUC has ample opportunity to integrate the concepts of economic sustainability into their curriculum and programming. The research also found that students at SIUC are experiencing an increase in sustainability knowledge as they move through their academic career. This research shows that the ASK Scale can be used as an effective tool for assessing students' current sustainability literacy.

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## CHAPTER 1

### INTRODUCTION

As the effects of climate change and class disparities become more visible, universities can assess their students' current level of sustainability literacy to plan how to further engage them in practices that mitigate the disasters of anthropogenic climate change and classism. Though assessment is just one step in the process of encouraging students to re-envision the world, it is imperative that universities ensure that their students are experiencing growth in their knowledge and understanding of sustainability. Assessing sustainability literacy allows a university to see if their students are acquiring the tools that they need to navigate making sustainable choices during and after their time in school. By using a standardized method of assessment, universities can compare their results and identify areas that require their attention. "Sustainability Literacy" includes the skills, knowledge and mindsets that lead individuals to become committed to building a sustainable future and help them make informed decisions (Sulitest 2020).

Southern Illinois University Carbondale (SIUC) is a public research institution (Carnegie 1) with an enrollment of 10,378 (Spring 2021) located in the rolling hills of rural southern Illinois. SIUC has a long history of student-driven sustainability activities. In the past, student surveys indicated support for green and sustainable actions on campus, but few students actively participate in sustainability outside of the School of Earth Systems and Sustainability's Geography Program. According to Cox (2015), this is true for many universities, in which the work of sustainability falls into the hands of a few students and faculty. At SIUC, there are some active registered student organizations on campus that are a large motivator for sustainability action on campus. The most consistent is Students Embracing Nature Sustainability and

Environmentalism (SENSE), which focuses on many different projects such as: pushing the university to divest from fossil fuels, transition to renewable energy, and collaborate with other groups to bolster sustainability on campus. In 2009, this student group was responsible for advocating for a student green fee, which in turn led to the development of SIUC's sustainability office.

This research investigates how the ASK (Assessment of Sustainability Knowledge) scale tool developed by Zwickle and Jones (2018) can be used to assess the current state of sustainability knowledge at SIUC. The goal of this research is to assess sustainability knowledge, provide SIUC with a framework for further assessment, and inform future sustainability planning and programming. The assessment data may be used in completing the Association for the Advancement of Sustainability in Higher Education (AASHE) "AC-6 Sustainability Literacy Assessment" section of the Sustainability Tracking, Assessment and Rating System (STARS) report. This thesis research will allow SIUC to assess and incorporate baseline information on sustainability knowledge among students to inform their programming for future semesters.

This research was proposed to address a gap in sustainability literacy assessment at SIUC. While several universities have outlined and identified specific sustainability literacy assessment plans, SIUC has not yet done so. Thus, this research will help identify a strategy that can be implemented in the future.

Before reviewing the current body of literature, there are some important distinctions to make in the definitions surrounding sustainability literacy. In 1987, the WCED released Our Common Future also known as the Brundtland Report which defined Sustainable development as: "development that meets the needs of the present without compromising the ability of future

generations to meet their own needs" (WCED 1987). When looking at sustainability literacy, it is important to distinguish between literacy and competency. According to Kokkarinen and Cotgrave (2013), "sustainability literacy is a learned skill that allows individuals to understand issues related to sustainability and be able to make choices which are conducive to sustainable development." Redman et al (2020) defines sustainability competency as combinations of skills, knowledge, and behaviors, which can present themselves in human action. This distinction is necessary when assessing literacy because being literate in sustainability is only a part of possessing competency in sustainability.

This paper attempts to close the gap in current research at SIUC through the following research questions:

### **Research Questions**

1. What is the current level of sustainability knowledge among Southern Illinois University Carbondale (SIUC) students?
2. How do major and year in school impact students' sustainability literacy at SIUC?
3. Which dimensions of sustainability (economic, environmental, or social) do SIUC students have the highest literacy in?

## CHAPTER 2

### LITERATURE REVIEW

This review analyzes the following themes: sustainability in higher education, sustainability literacy, and sustainability literacy assessment

#### 2.1 Search Methods

In an effort to find relevant articles and current research, the literature search focused on sustainability literacy assessment in higher education. In search of relevant articles, the keywords were related to sustainability in higher education, sustainability literacy, and sustainability assessment. Keywords included various combinations of the following words and phrases: “sustainability literacy,” “sustainability literacy assessment,” “sustainability literacy in higher education.” These keywords were run through EBSCOhost, Google Scholar, and Southern Illinois University’s OneSearch in the spring of 2020, with a follow up in spring 2021. Overall, this search yielded less than 100 articles. To further narrow them down to a manageable number of articles, the articles were limited to ones that were published in peer-reviewed, scholarly journals, and were written in English. This resulted in a refined pool of about 35 articles. The abstracts of these were reviewed, looking for articles that contained research about sustainability literacy assessment in higher education, which led to the final set of 20 articles that are reviewed in this paper. The reference lists for these were checked to find additional sources related to this research.

#### 2.2 Sustainability in Higher Education

First, this review will look at the history of sustainability in higher education. Every university supports sustainability to a different degree. At many institutions, like SIUC, students have led the charge to make sustainability a focus for the university. That has come in

many forms, implementing a student green fee, creating a sustainability office, forming a committee or council to oversee a green fee (Cox 2015). This shows a commitment from students to push sustainability at their institutions. Other ways that growth in sustainability occurs at higher education institutions is through the creation of sustainability classes, student groups and the signing of pledges to commit to sustainability and climate action. Examples of pledges include the Talloires Declaration and the Second Nature Climate Commitment. Once these commitments have been signed, many universities move onto the next step, creating a campus sustainability plan (Cox 2015). This allows for a more comprehensive integration of sustainability throughout a campus.

Throughout higher education institutions, there are many sustainability-minded student groups, such as SIUC's SENSE, which is students embracing nature sustainability and environmentalism. These groups are often the voice of sustainable action that does not yet exist for the university. These groups may be tackling issues such as getting recycling bins installed, composting systems in dining halls, removal of single serving waste, advocating for social justice, and in the last decade, pushing universities to divest from fossil fuels. Viewing a higher education institution through the lens of sustainability turns the entire campus into a living learning lab (Cox 2015, Kokkarinen and Cotgrave 2013, Heeren et al. 2016). The AASHE STARS report helps campuses identify areas for future growth. While there are individuals and groups of students that are focused on addressing sustainability or the lack thereof on their campuses, it is still a relatively low number of students that are in these groups. Contrary to the student-led initiative that created the sustainability office at SIUC, Butt et al (2013) points out that due to this level of student engagement, it leads to a lower student impact on decision making. This paper also states that with a low level of student involvement that it leaves

university employees as a primary driver for sustainability on campus. After using a sustainability literacy assessment tool, sustainability studies programs can be developed and grown to address the lack of comprehension of certain concepts. For example, many students may have a basic understanding of the purpose of recycling and how to do it but may not understand how organic food is connected to an agriculture worker's wellbeing. These everyday choices can be built in through systems, such as educational signage at university dining halls. While it may not be part of a student's curriculum who is studying in a non-sustainability-focused degree, it is still a crucial piece of education occurring on university campuses.

One way that sustainability offices promote sustainability literacy on their campuses is by offering and leading green tours. This provides students, staff, and community members with an opportunity to see sustainability in action on the campus and to discuss how different projects fit into sustainability. Even though sustainability tours are often free and can be attended or scheduled by individuals or classes, they are far often underutilized. Trahan et al (2017) states that while tours serve as a great opportunity to increase sustainability knowledge on campuses, there is not enough research to show how they can more effectively be utilized to increase sustainability literacy. This lack of data also leads to difficulty in validating a tour's status as an effective and essential tool (Trahan et al. 2017). By implementing these systems and structures, it provides an avenue for students to see and learn about sustainability on their own campuses and communities.

### 2.3 Sustainability Literacy

Sustainability Literacy can be viewed as the ability to act on knowledge gained about sustainability (Stibbe 2011). Sustainability literacy is inherently easier to teach in the fields of environmental science and sustainability, due to the learning of environmental problems, which

allows for more awareness of possible solutions (Heeren et al. 2016). These authors also assert that it is important to increase education about environmental problems, but that knowledge alone does not increase environmentally friendly behaviors. Instead, providing students with the information and tools necessary to make their own decisions is an important step towards them practicing sustainable behaviors. Heeren et al. (2016) conclude that knowledge alone may not have the greatest effect on sustainable behaviors, but instead, there should be more research conducted into the effects of social norms and other social interactions. Serpa and Sá (2018) provide evidence for the ease of the field of sociology to teach sustainability literacy, specifically providing examples related to the United Nations Sustainable Development Goals (SDGs). The United Nations' SDGs are a set of 17 goals to address inequalities and unsustainable practices around the use of our resources (United Nations n.d). Exposing students to sustainability literacy just one time is no longer an option, due to likely future climatic catastrophes, rather we need to build a learning society that gains sustainability literacy skills throughout the educational systems currently in place (Davies 2012).

AASHE was formed in 2001, to help universities grow their sustainability programs, education, and initiatives (AASHE n.d). STARS is the assessment system created by AASHE to help universities gauge their current standing and compare to other universities to identify their areas for future growth (AASHE 2013). Two specific areas of STARS that are directly connected to this research are: AC-2 Learning Outcomes (AC-2) and AC-6 Sustainability Literacy Assessment (AC-6). After identifying an effective assessment tool to implement at SIUC, the sustainability office can use that data, potentially in 2023, to track the university's growth in teaching sustainability to its students. Currently, each department at SIUC has identified student learning objectives (SLOs) for their students' growth.

## 2.4 Assessment

Assessing sustainability knowledge allows a university to see if their students are acquiring the tools that they need to navigate making sustainable choices during and after their time in school. By using a standardized method of assessment, universities can compare their results and identify areas that require their attention. Zwickle et al (2018) points out that the ASK Scale is better for assessing sustainability knowledge than using the Revised New Ecological Paradigm, which are well-known surveys designed to measure environmental values, concerns, and attitudes (Dunlap et al. 1978 and Dunlap et al. 2000).

In contrast, ASK was created in 2013 because of a lack of sustainability knowledge assessment tools, but in the last few years, several other tools have been created separately, such as SULITEST and SUSTLIT. Additionally, several other tools have been designed based on ASK, such as University of Maryland's SKA (Zwickle et al. 2014, Heeren et al. 2016, Akeel et al. 2019, Lundquist et al. 2018, Marshall et al. 2018).

### 2.4.1 Assessment of Sustainability Knowledge (ASK)

According to Zwickle and Jones (2018), the ASK tool started out as 16 questions, but was reduced to 12 for their more recent paper. This tool is designed based on sustainability consisting of three domains. Initially, the questions were each designed to focus on one domain of sustainability, but after partnering with researchers at the University of Maryland, who added questions and blended two or three domains into each question, the ASK tool was edited. Its current form is 12 questions that were shortened and edited after reviewing the work from University of Maryland (Zwickle et al. 2014). All 12 questions are now blended between two and three domains of sustainability.

#### 2.4.2 United Nations' Sulitest

According to Décamps et al (2016), each of Sulitest's sessions consist of at least 30 questions from a much larger questions bank. There are typically another 20 'local' questions added to the original 30 questions. Finally, there is an anonymous survey to gather socio-demographic information about the survey-taker. This tool is used internationally and is currently likely the most widely utilized. Mason (2019) found that Sulitest is a useful tool for sustainability literacy assessment, which can also build an interest in sustainability within a student group taking the assessment.

#### 2.4.3 SUSTLIT

This tool was created by Obermiller and Atwood (2014) at Seattle University. For the SUSTLIT tool, sustainability is defined in six dimensions: "...climate change, energy, planetary assets, systems, environmental justice, and organizational influences, plus a set of definition questions." The survey is 84 questions meant to assess sustainability knowledge, behavior, and attitudes. Of the questions, 49 are focused on sustainability knowledge. Additionally, most of the questions overall are Likert scale, except for socio-demographic questions and two open-ended short-answer questions.

#### 2.4.4 Assessment of Sustainability Literacy

In research conducted by Akeel et al (2018), they designed an assessment tool based on the other tools already developed, specifically the ASK tool. However, they chose to make all 15 of their questions true, false, or do not know. They have a question asking if the survey-taker is aware of the United Nations Decade of Education for Sustainable Development and another question asking the survey-taker to rate their own sustainability knowledge based on the 15 questions. Rather than focus on the 3 main dimensions of sustainability, this study uses three

criteria to measure sustainability literacy of the stakeholders involved: awareness of the UN Decade of Education for Sustainable Development, score on the sustainability literacy test, and self-assessment of sustainability knowledge.

#### 2.4.5 University of Maryland's SKA

This tool takes the ASK tool and builds upon it, for a total of 30 questions. Instead of each question focusing on one domain of sustainability, this tool blends two or three domains into each question.

#### 2.5 Challenges present

There is a gap in research on this topic, as seen in the fact that these articles and studies had a relatively small sample size or the inclusion criteria left too few results. Further study will aid in continuing the closure of this gap in knowledge. While extensive research about student sustainability literacy has been conducted, much less based on the role that assessment plays in curriculum and program development.

## CHAPTER 3

### METHODS

#### 3.1 Introduction

After gaining approval from SIUC's Institutional Review Board in April of 2020, I sent out the survey as an announcement on Desire2Learn (D2L), which is the main online platform for classes at SIUC. This post titled, "SIU Sustainability Survey!" said, "Help the Sustainability Office with research, by taking this survey! The survey should only take 5 – 10 minutes to complete. All responses will remain anonymous. (Survey link inserted here) Thanks for your time!" See Appendices A and B for the full documents. To answer the research questions, I surveyed students using the ASK Scale survey. The survey consisted of all 12 unaltered questions from the ASK Scale, in addition to questions about participant's year in school and major. This research was designed as a quantitative study.

#### 3.2 Sample Population

The population consisted of students attending SIUC in Carbondale, Illinois. D2L was identified as the best place to post the survey for students to access, given the restrictions put in place to mitigate the spread of COVID-19. Due to the opt-in nature of this survey, there is a self-selection bias. This allowed for a non-probability random sample. The student population for Spring 2020 was 10,779.

#### 3.3 Survey Selection

The survey was based on the ASK Scale survey, which was developed by researchers that reviewed much of the past literature to find survey questions and respondent grouping methods, to create a standardized measurement scale. They then conducted studies at several locations to test the performance of the scale (Zwickle and Jones 2018). After the initial ASK survey was

created, they worked with the University of Maryland to add and refine questions, which blended two to three dimensions of sustainability into each question. However, in this research, based on the literature, I have chosen to split them into the three dimensions of sustainability (economic, social, and environmental) based on which dimension is most evident in the question, in addition to reflecting the sorting from Zwickle et al (2014). This was done to address the third research question: Which dimensions of sustainability (economic, environmental, or social) do SIUC students have the highest literacy in?

All the questions on the ASK survey are multiple choice, each with a last option of “Don’t know.” While the full list of survey questions is available in Appendix A, what follows is a list of examples for each dimension of sustainability. These questions are also categorized in table 4.1. The correct answers are in bold.

Environmentally focused questions are included to gauge students understanding of the impact of environmental health on the natural world, including humans. Examples of questions on the ASK Scale survey related to environmental factors are:

1. “What is the most common cause of pollution of streams and rivers?”
  - a. Dumping of garbage by cities
  - b. Surface water running off yards, city streets, paved lots, and farm fields**
  - c. Litter near streams and rivers
  - d. Waste dumped by factories
  - e. Don’t know
2. “Which of the following is an example of sustainable forest management?”
  - a. Setting aside forests to be off limits to the public
  - b. Never harvesting more than what the forest produces in new growth**
  - c. Producing lumber for nearby communities to build affordable housing
  - d. Putting the local communities in charge of forest resources
  - e. Don’t know
3. “Of the following, which would be considered living in the most environmentally sustainable way?”

- a. Recycling all recyclable packaging
  - b. Reducing consumption of all products**
  - c. Buying products labeled “eco” or “green”
  - d. Buying the newest products available
  - e. Don’t know
4. Ozone forms a protective layer in the earth’s upper atmosphere. What does ozone protect us from?
- a. Acid rain
  - b. Climate change
  - c. Sudden changes in temperature
  - d. Harmful UV rays**
  - e. Don’t know
5. Put the following list in order of the activities with the largest environmental impact to those with the smallest environmental impact:
- A. Keeping a cell phone charger plugged into an electrical outlet for 12 h
  - B. Producing one McDonald’s quarter-pound hamburger
  - C. Producing one McDonald’s chicken sandwich
  - D. Flying in a commercial airplane from Washington D.C. to China
- a. A, C, B, D
  - b. D, A, B, C
  - c. D, C, B, A
  - d. D, B, C, A**
  - e. Don’t know

Economically focused questions are included to gauge students understanding of economic prosperity in our society. Examples of questions on the ASK Scale survey related to economic factors are:

1. “Which of the following is the most commonly used definition of economic sustainability?”
  - a. Maximizing the share price of a company’s stock
  - b. Long term profitability**
  - c. When costs equal revenue
  - d. Continually expanding market share
  - e. Don’t know
2. “Many economists argue that electricity prices in the U.S. are too low because...”

- a. **They do not reflect the costs of pollution from generating the electricity**
  - b. Too many suppliers go out of business
  - c. Electric companies have a monopoly in their service area
  - d. Consumers spend only a small part of their income on energy
  - e. Don't know
3. Which of the following countries passed the U.S. to become the largest emitter of the greenhouse gas carbon dioxide?
- a. **China**
  - b. Sweden
  - c. Brazil
  - d. Japan
  - e. Don't know
4. Which of the following is a leading cause of the depletion of fish stocks in the Atlantic Ocean?
- a. **Fishermen seeking to maximize their catch**
  - b. Reduced fish fertility due to genetic hybridization
  - c. Ocean pollution
  - d. Global climate change
  - e. Don't know

Socially focused questions are included to gauge students understanding of social equity in our world. Examples of questions on the ASK Scale survey related to social factors are:

1. "Which of the following is the best example of environmental justice?"
  - a. Urban citizens win a bill to have toxic wastes taken to rural communities
  - b. The government dams a river, flooding Native American tribal lands to create hydro-power for large cities
  - c. **All stakeholders from an indigenous community are involved in setting a quota for the amount of wood they can take from a protected forest next to their village**
  - d. Multi-national corporations build factories in developing countries where environmental laws are less strict.
  - e. Don't know
2. "Which of the following is the most commonly used definition of sustainable development?"
  - a. Creating a government welfare system that ensures universal access to education, health care, and social services
  - b. Setting aside resources for preservation, never to be used

- c. **Meeting the needs of the present without compromising the ability of future generations to meet their own needs**
  - d. Building a neighborhood that is both socio-demographically and economically diverse
  - e. Don't know
3. "Over the past 3 decades, what has happened to the difference between the wealth of the richest and poorest Americans?"
- a. **The difference has increased**
  - b. The difference has stayed about the same
  - c. The difference has decreased
  - d. Don't know

### 3.4 Online Survey Distribution

This survey was conducted via a non-probability random sample through SIUC's D2L page. Data was collected by using an online survey that was posted twice on D2L during the spring semester in 2020. The survey was posted initially on Friday, April 24, 2020 at 12:35p, then reposted Tuesday, April 28, 2020 at 12:00p. The survey was removed from D2L on May 2, 2020.

### 3.5 Data Analysis

Descriptive statistical analyses were used to evaluate the outcomes of this data. After the data was collected, I looked at the several factors to assess the sustainability knowledge of students at SIUC. The factors identified to answer this study's research questions are: ASK Score by year in school, ASK Score by major, and ASK Score by dimension of sustainability. The questions from the survey were analyzed using Microsoft Excel to find the results listed in the next section.

Again, the overall research questions driving this research project were:

### **Research Questions**

1. What is the current level of sustainability knowledge among Southern Illinois

University Carbondale (SIUC) students?

2. How do major and year in school impact students' sustainability literacy at SIUC?
3. Which dimensions of sustainability (economic, environmental, or social) do SIUC students have the highest literacy in?

## CHAPTER 4

### RESULTS

#### 4.1 Introduction

There were 200 responses to the online survey. After data cleaning and removing faculty from the response pool, I found 180 responses to be within the defined parameters for this study. This research has assessed the level of sustainability knowledge among students at SIUC.

This study consisted of a cross-section in time, rather than a pre- and post- test. This allowed for the identification of a baseline, such that in the future, after a full pre- and post-assessment plan is identified, it can be implemented with ease.

#### 4.2 Survey Results

The results section will be divided into sections based on research question. Figure 4.1 shows the level of sustainability knowledge among SIUC students based on their ASK Score (range 0-12). It is important to note that the y-axis begins at a score of 8.0 on the ASK Scale, which has a maximum score of 12. This axis range was chosen to better show the difference of average ASK scores for major and class standing, which occurred between 8.14 and 9.05.

##### 4.2.1 Research Question One – Current Knowledge

Research Question One investigated the current sustainability knowledge among students at SIUC. The mean for 180 respondents was 8.61 out of 12.00. The median was 9.00. The mode was 9.00. The scores ranged from 0.00 – 12.00. Table 4.1 shows the percentage of correct answers for each question, along with the dimension of sustainability that the question is rooted in. Table 4.2 shows the ASK results by class standing. Finally, Table 4.3 shows the ASK results by major.

**Table 4.1** ASK results by question

ASK survey questions	Percentage of correct answers	Dimension
1. What is the most common cause of pollution of streams and rivers?	57.22%	Environmental
2. Ozone forms a protective layer in the earth's upper atmosphere. What does ozone protect us from?	91.67%	Environmental
3. Which of the following is an example of sustainable forest management?	83.33%	Environmental
4. Of the following, which would be considered living in the most environmentally sustainable way?	71.67%	Environmental
5. Which of the following is the most commonly used definition of sustainable development?	85.00%	Social
6. Over the past 3 decades, what has happened to the difference between the wealth of the richest and poorest Americans?	88.33%	Social
7. Many economists argue that electricity prices in the U.S. are too low because...	57.78%	Economic
8. Which of the following is the most commonly used definition of economic sustainability?	51.67%	Economic
9. Which of the following countries passed the U.S. to become the largest emitter of the greenhouse gas carbon dioxide?	91.67%	Economic
10. Which of the following is a leading cause of the depletion of fish stocks in the Atlantic Ocean?	35.56%	Economic
11. Which of the following is the best example of environmental justice?	80.56%	Social
12. Put the following list in order of the activities with the largest environmental impact to those with the smallest environmental impact:	66.67%	Environmental

**Table 4.2** ASK results by class standing

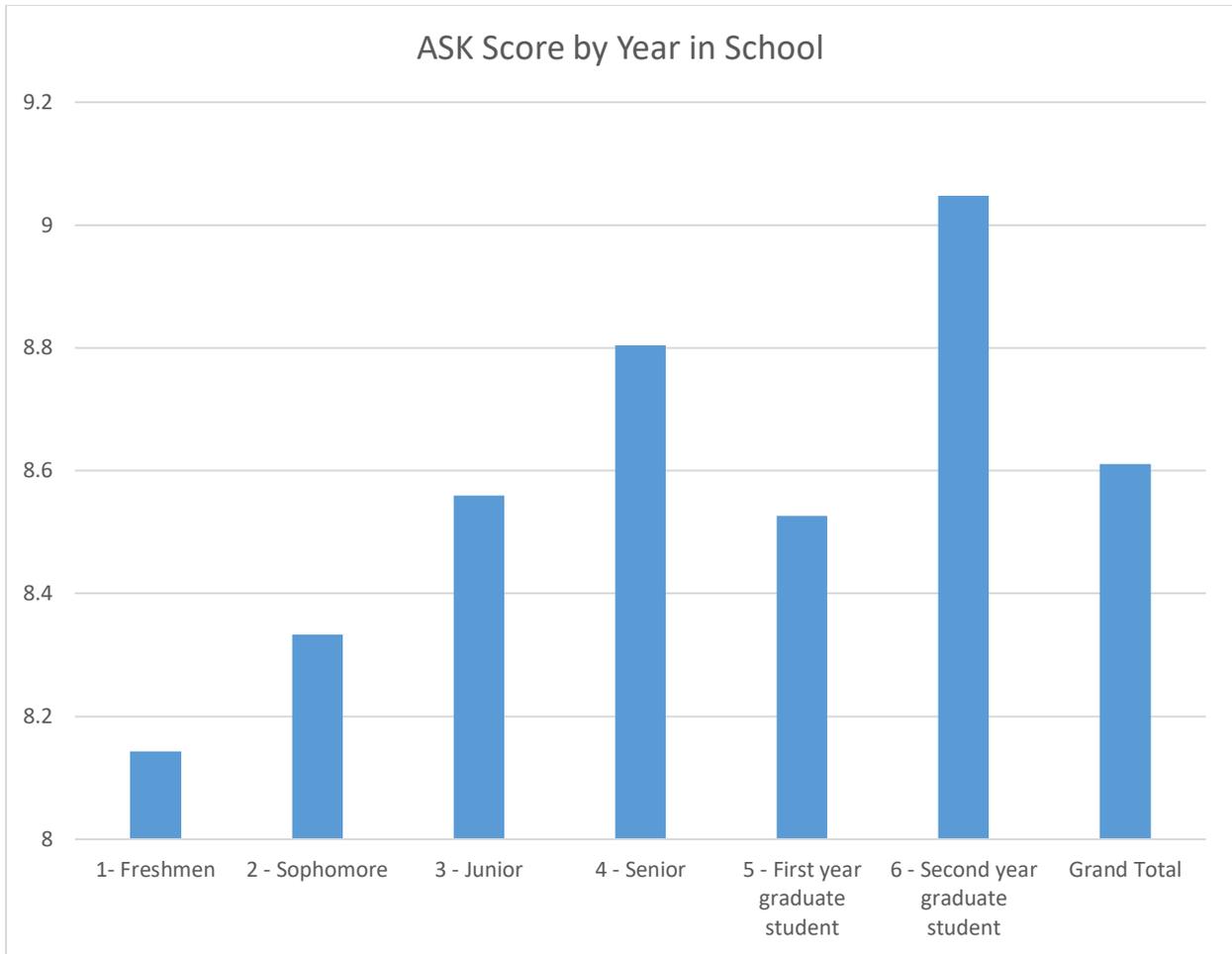
Class Standing	Number of students
Freshmen	21
Sophomore	18
Junior	50
Senior	51
1 <sup>st</sup> year grad student	19
2 <sup>nd</sup> year grad student	21
<b>Total</b>	<b>180</b>

**Table 4.3** ASK results by major

<b>Majors (with 3 or more students represented)</b>	ASK Score	Number of students
Public Health	9.33	3
Biological Sciences	9.67	3
Social Work	7.00	3
Criminology and Criminal Justice	7.00	3
Civil Engineering	7.00	3
Plant biology	10.67	3
Cinema and Photography	6.67	3
Architecture	8.33	3
Undeclared	8.00	3
Recreation	8.75	4
Economics	8.75	4
Mechanical Engineering	8.4	5
Healthcare Management	6.83	6
Zoology	9.67	6
Psychology	9.29	7
Forestry	9.56	9
Animal Science	9.00	9
Geography and Environmental Resources	10.89	9

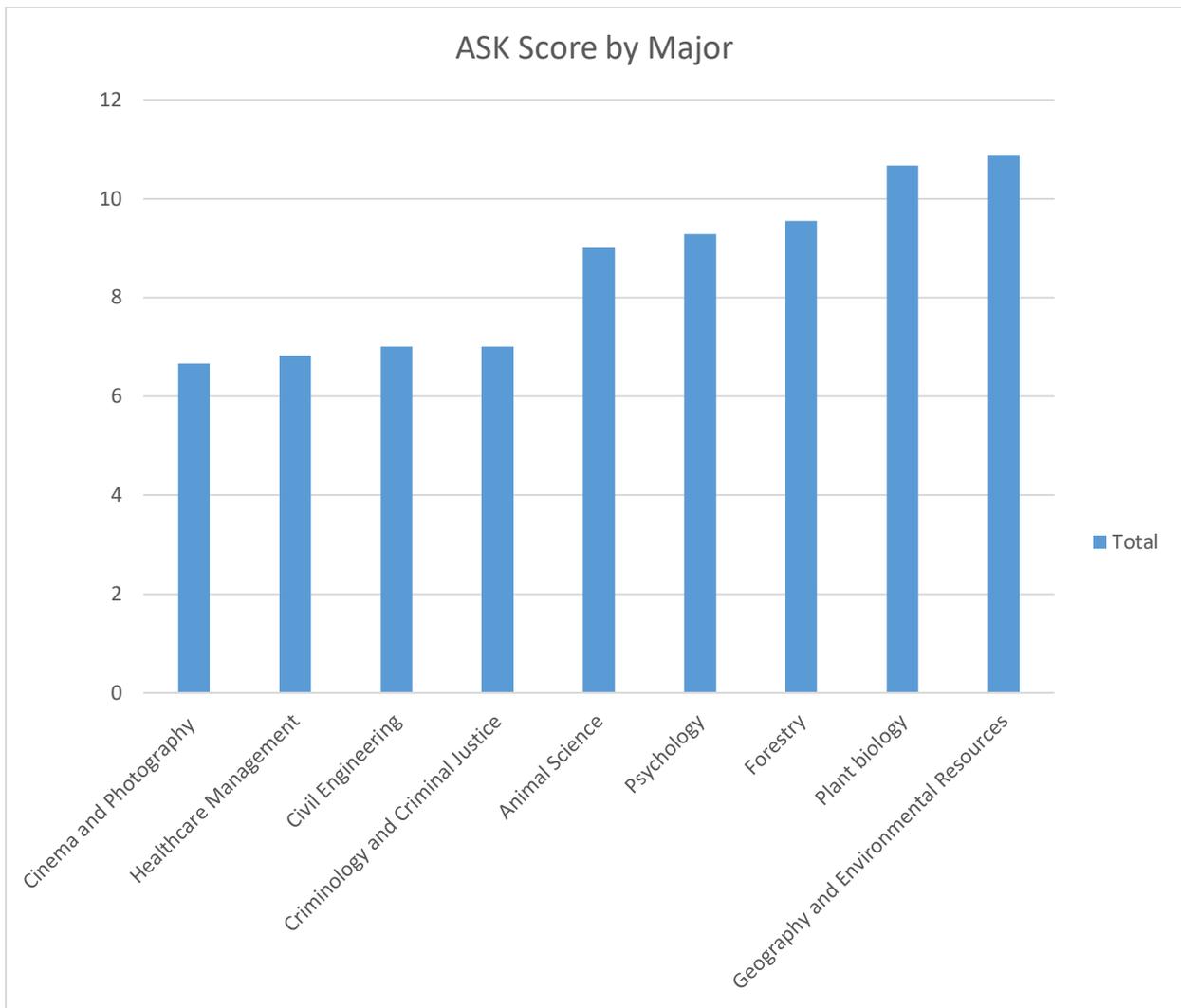
#### 4.2.2 Research Question Two – Major and Year in School

Research Question Two investigated how a student’s major and year in school may impact their sustainability literacy. The results in Figure 4.1 show which class standing (Freshman, Sophomore, Junior, Senior, first year Graduate Student, and second year Graduate Student) has the highest level of sustainability knowledge. When comparing the average scores for student’s year in school, Figure 4.1 illustrates that there is a trend of increasing sustainability knowledge as a student progresses in their time at SIUC. The same is true when comparing first and second year graduate students.



**Figure 4.1** ASK Score by year in school

The results in Figure 4.2 show which majors have the highest level of sustainability knowledge and whether having a specific major greatly increases a participant’s sustainability knowledge. For Figure 4.2, a major is only included if at least 3 people answered from that major. Among majors at SIUC, this shows that on average, students in Geography and Environmental Resources, Plant Biology, and Forestry possess a higher sustainability knowledge. Cinema and Photography, Healthcare Management, Civil Engineering, and Criminology and Criminal Justice scored lower on the ASK Scale.



**Figure 4.2** ASK Score by major

#### 4.2.3 Research Question Three – Highest Dimension

To identify the dimension of sustainability that students have the highest literacy in, the ASK survey questions were grouped by dimension of sustainability. The percentages in Figure 4.3 show the average scores for each dimension across the entire sample. Students scored much higher in the social dimension of sustainability than in the economic dimension.

Average Environmental	74.11%
Average Social	84.63%
Average Economic	59.17%

**Figure 4.3** ASK Score by dimension of sustainability (score out of 12 shown as a percentage)

## CHAPTER 5

### DISCUSSION

#### 5.1 Introduction

The purpose of this study was to identify a survey effective for assessing the sustainability literacy among students at SIUC. The decision to use the ASK scale was made based on its conciseness of 12 questions and through the review of literature that found it to be an effective tool at other higher education institutions. While this survey method worked, many students were also feeling online learning exhaustion and this survey appeared among numerous other posts on D2L. At SIUC, there is not currently a requirement for students to take a sustainability literacy assessment at any point during their university career. Since SIUC lacks this captive audience, there will be selection bias present from the survey data collected now and in the future, due to the opt-in nature of the survey.

#### 5.2 Discussion of results at SIUC

These findings show the level of sustainability knowledge among students at SIUC in the spring of 2020. This study found that the average ASK score among students at SIUC is 8.61 out of 12.00, which shows that students who took this survey do possess a relatively high sustainability knowledge. To address research question two, the findings show that there are students in specific majors and years in school that are more inclined to possess a higher level of sustainability knowledge. The majors that scored highest on the ASK Scale (Geography and Environmental Resources, Plant Biology, and Forestry) were somewhat expected, given that those majors inherently incorporate sustainability and environmental issues into their curriculum. However, majors that do not naturally teach about sustainability and environmental issues, such as Cinema and Photography, Healthcare Management, Civil Engineering, and Criminology and

Criminal Justice scored lower on the ASK Scale. This is important to note as it is crucial that sustainability be addressed in those majors, especially as we look at the lack of social sustainability and social justice occurring in our world that can be addressed in those fields. Additionally, an average of 8.14 (67.83%) for freshmen and an average of 8.80 (71.75%) for seniors shows that students are gaining sustainability knowledge while at this institution. While some growth is to be expected, it seems that this is a somewhat small increase overall at a 3.92% difference.

Finally, to address research question three, the results have shown that students at SIUC tend to have the highest understanding of the social domain of sustainability (average score 84.63%), followed closely by the environmental domain (average score 74.11%). As may be expected of many students that may be just out of high school, who are not yet typically responsible for sustaining their own finances or thinking of other's finances, their understanding of the economic domain was the lowest (average score 59.17%). This shows that SIUC has ample opportunity to integrate the concepts of economic sustainability into their curriculum and programming.

## CHAPTER 6

### CONCLUSION

#### 6.1 Summary

This research shows that the ASK Scale can be used as an effective tool for assessing students' current sustainability literacy. Students at SIUC are experiencing an increase in sustainability knowledge as they move through their academic career. Majors such as Plant Biology, Forestry, and Geography and Environmental Resources, which tend to intentionally teach sustainability, have a higher baseline of sustainability knowledge. This research can serve as a guide when planning the next wave of sustainability literacy assessment for SIUC.

#### 6.2 Conclusion

University programs have the power to re-align curriculum to meet the challenges that the world currently faces. This includes climate change, loss of biodiversity, and more. The purpose of this research is to assess the degree to which students are gaining literacy in sustainability through their classes and experiences at SIUC. Of course, an assessment of knowledge alone is not an effective measure of sustainability literacy. Likewise increasing knowledge alone does not necessarily cause a positive change in behavior. However, there is not a negative consequence to increasing students' knowledge and understanding of sustainability.

Sulitest has also been shown to be a very effective tool but is limited to students willing to take a longer survey, around 50 questions. For SIUC, Sulitest would be an effective tool for specific majors and professors to use, who can request students take the survey during class. However, to get a better representative baseline of sustainability knowledge across the university, ASK is more approachable for students to fill out if they randomly receive it. By assessing student's sustainability literacy, it provides an opportunity to identify areas for growth

for the university. In majors that do not already address sustainability in their curriculum, there is a great need for growth to occur in order to raise the overall sustainability literacy of the students at SIUC.

While possessing a high level of literacy in sustainability may not directly affect sustainability behaviors, higher education can strive to bridge this gap by implementing and modifying curriculum and student learning goals. This understanding is important because it can lead to higher education institutions being a vector for students to gain sustainability literacy.

### 6.3 Recommendations

Throughout this process, I have identified some limitations of this study and its use. Sustainability knowledge and literacy do not translate directly to sustainability attitudes, behaviors, or actions. It seems that the best fit for SIUC would be for students to be surveyed every 3-4 years at the beginning and end of the academic year. The data can then be compared to subsequent rounds of freshmen, to assess their collective average level of sustainability knowledge. Additionally, questions should be added to gauge whether students have taken classes focused on sustainability e.g., urban sustainability, sustainable development, natural resource conflict management, sustainable architecture, etc. Finally, students should be asked about having a minor, specifically if they are an environmental studies minor. Now that this research is complete, it can serve as a resource for the SIUC Sustainability Office to use to target an appropriate long-term assessment plan.

Based on this research, the major recommendation is for SIUC, campus-wise, to prioritize promoting the growth of students' understanding of sustainability locally and in the world around them. Once SIUC has a plan for future sustainability literacy assessments, this will allow for the university to use this baseline to establish goals and specific topics for future

growth. Overall, this research indicates that SIUC should focus on building sustainability literacy into competency and action.

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## APPENDIX A

### ASK SCALE SURVEY

Notes:

- This survey was developed by Zwickle et al. (2014), then revised by Zwickle, Koontz, and Hamm (2018)
- All correct answers are bolded
- The survey was sent out as a Google form, with the following 14 questions.

#### ASK (Assessment of Sustainability Knowledge)

1. What is the most common cause of pollution of streams and rivers?
  - a. Dumping of garbage by cities
  - b. Surface water running off yards, city streets, paved lots, and farm fields**
  - c. Litter near streams and rivers
  - d. Waste dumped by factories
  - e. Don't know
  
2. Ozone forms a protective layer in the earth's upper atmosphere. What does ozone protect us from?
  - a. Acid rain
  - b. Climate change
  - c. Sudden changes in temperature
  - d. Harmful UV rays**
  - e. Don't know
  
3. Which of the following is an example of sustainable forest management?
  - a. Setting aside forests to be off limits to the public
  - b. Never harvesting more than what the forest produces in new growth**
  - c. Producing lumber for nearby communities to build affordable housing
  - d. Putting the local communities in charge of forest resources
  - e. Don't know
  
4. Of the following, which would be considered living in the most environmentally sustainable way?
  - a. Recycling all recyclable packaging
  - b. Reducing consumption of all products**
  - c. Buying products labeled "eco" or "green"
  - d. Buying the newest products available
  - e. Don't know

5. Which of the following is the most commonly used definition of sustainable development?
  - a. Creating a government welfare system that ensures universal access to education, health care, and social services
  - b. Setting aside resources for preservation, never to be used
  - c. Meeting the needs of the present without compromising the ability of future generations to meet their own needs**
  - d. Building a neighborhood that is both socio-demographically and economically diverse
  - e. Don't know
  
6. Over the past 3 decades, what has happened to the difference between the wealth of the richest and poorest Americans?
  - a. The difference has increased**
  - b. The difference has stayed about the same
  - c. The difference has decreased
  - d. Don't know
  
7. Many economists argue that electricity prices in the U.S. are too low because...
  - a. They do not reflect the costs of pollution from generating the electricity**
  - b. Too many suppliers go out of business
  - c. Electric companies have a monopoly in their service area
  - d. Consumers spend only a small part of their income on energy
  - e. Don't know
  
8. Which of the following is the most commonly used definition of economic sustainability?
  - a. Maximizing the share price of a company's stock
  - b. Long term profitability**
  - c. When costs equal revenue
  - d. Continually expanding market share
  - e. Don't know
  
9. Which of the following countries passed the U.S. to become the largest emitter of the greenhouse gas carbon dioxide?
  - a. China**
  - b. Sweden
  - c. Brazil
  - d. Japan
  - e. Don't know

10. Which of the following is a leading cause of the depletion of fish stocks in the Atlantic Ocean?
- a. **Fishermen seeking to maximize their catch**
  - b. Reduced fish fertility due to genetic hybridization
  - c. Ocean pollution
  - d. Global climate change
  - e. Don't know
11. Which of the following is the best example of environmental justice?
- a. Urban citizens win a bill to have toxic wastes taken to rural communities
  - b. The government dams a river, flooding Native American tribal lands to create hydro-power for large cities
  - c. **All stakeholders from an indigenous community are involved in setting a quota for the amount of wood they can take from a protected forest next to their village**
  - d. Multi-national corporations build factories in developing countries where environmental laws are less strict.
  - e. Don't know
12. Put the following list in order of the activities with the largest environmental impact to those with the smallest environmental impact:
- A. Keeping a cell phone charger plugged into an electrical outlet for 12 h
  - B. Producing one McDonald's quarter-pound hamburger
  - C. Producing one McDonald's chicken sandwich
  - D. Flying in a commercial airplane from Washington D.C. to China
- a. A, C, B, D
  - b. D, A, B, C
  - c. D, C, B, A
  - d. **D, B, C, A**
  - e. Don't know

Note: The following 2 questions are not part of the ASK survey, they have been added to collect demographic information:

13. Which of the following best describes you?

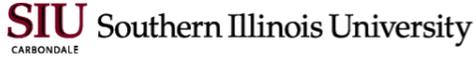
- a. Freshmen
- b. Sophomore
- c. Junior
- d. Senior
- e. First year graduate student that did not attend SIU for undergrad
- f. First year graduate student that did attend SIU for undergrad
- g. Second year graduate student
- h. Other \_\_\_\_\_

14. What is your major(s) at SIU?

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## APPENDIX B

### HUMAN SUBJECTS COMMITTEE APPROVAL LETTER



HUMAN SUBJECTS COMMITTEE  
OFFICE OF RESEARCH COMPLIANCE  
WOODY HALL - MAIL CODE 4344  
900 SOUTH NORMAL AVENUE  
CARBONDALE, ILLINOIS 62901

siuhsc@siu.edu  
618/453-4533  
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HSC Approval letter (exempt 2)

To: Nicholas Erwin  
From: M. Daniel Becque  
Chair, Human Subjects Committee  
Date: April 13, 2020

*Title: SIU Sustainability Literacy Assessment*

Protocol Number: 20132

The revisions to the above referenced study have been approved by the SIUC Human Subjects Committee. This approval includes all aspects of the project. The study is determined to be exempt according to 45 CFR. 46.101(b)2. This approval does not have an expiration date; however, any future modifications to your protocol must be submitted to the Committee for review and approval prior to their implementation.

Best wishes for a successful study.

This institution has an Assurance on file with the USDHHS Office of Human Research Protection. The Assurance number is 00005334.

MDB:ssw

Cc: Leslie Duram

## APPENDIX C

### COPYRIGHT PERMISSION

**RE: ASK survey inquiry**

Zwickle, Adam <[zwicklea@msu.edu](mailto:zwicklea@msu.edu)>

Mon 6/28/2021 9:27 AM

To: Erwin, Nicholas D <[nickerwin@siu.edu](mailto:nickerwin@siu.edu)>

**[EXTERNAL EMAIL ALERT]:** Verify sender before opening links or attachments.

Nick,

Thank you for the email and congratulations on your thesis. You have my approval to include the entire ASK, it's answers, and any other aspects of my work that you have cited in your thesis in any form.

What is in store for you following your Master's program? Are you continuing on to your PhD, or transitioning into a position with a university sustainability office?

All the best,  
Adam

---

**From:** Erwin, Nicholas D <[nick.erwin@siu.edu](mailto:nick.erwin@siu.edu)>

**Sent:** Sunday, June 27, 2021 5:55 PM

**To:** Zwickle, Adam <[zwicklea@msu.edu](mailto:zwicklea@msu.edu)>

**Subject:** Re: ASK survey inquiry

Hi Dr. Zwickle,

In my email from last April, I asked to use the ASK survey at Southern Illinois University Carbondale for my thesis research among students at SIUC, to which you kindly agreed. However, I'm hoping to see if I can actually list the survey and the questions in their entirety in my thesis. I've attached a working copy of my thesis for your reference as to where/how I'm hoping to include the questions.

For ease, the questions are listed on pages 13-15, again in table 4.1 on page 18, and listed in appendix B on page 35.

The grad school here has informed me that to submit my thesis in its current form, I would specifically need approval for including the survey in its entirety to abide by the copyright requirements.

Thanks again!

Nick Erwin | SIU Carbondale (Pronouns: he/him/his)

M.S. Student - Geography and Environmental Resources

Sustainability Office - Graduate Assistant

[S.E.N.S.E.](#) - Committee Chair

[nick.erwin@siu.edu](mailto:nick.erwin@siu.edu) | 618-954-6994

**RE: ASK survey inquiry**

Zwickle, Adam <[zwicklea@msu.edu](mailto:zwicklea@msu.edu)>

Fri 4/10/2020 8:51 AM

To: Erwin, Nicholas D <[nickerwin@siu.edu](mailto:nickerwin@siu.edu)>

 1 attachments (173 KB)

Zwickle & Jones, 2018pdf;

**[EXTERNAL EMAIL ALERT]:** Verify sender before opening links or attachments.

Hey Nick, thanks for the email...I hope you are doing well.

You can certainly use the ASK. You should use the "revised" version found in this chapter. Let me know if you have any questions.

Good luck!

Adam

---

**From:** Erwin, Nicholas D <[nick.erwin@siu.edu](mailto:nick.erwin@siu.edu)>

**Sent:** Thursday, April 9, 2020 3:11 PM

**To:** Zwickle, Adam <[zwicklea@msu.edu](mailto:zwicklea@msu.edu)>

**Subject:** ASK survey inquiry

Hi Dr. Zwickle,

I'm a student at Southern Illinois University Carbondale, working on my master's thesis focused on assessing sustainability literacy at SIU. I'm reaching out because I'm hoping to use the ASK survey for this research. I'll be working in collaboration with our sustainability office to create an assessment plan for students as they enter and leave the university.

Thanks!

Nick Erwin | SIU Carbondale (Pronouns: he/him/his)

M.S. Student - Recreation and Geography/Environmental Resources

Teaching Assistant - [200 level Outdoor Rec Courses](#)

[Sustainability Office Fellow](#) - Spring 2020

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VITA

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2021 William O'Brien Outstanding Graduate Student Award

Thesis Paper Title:

Investigating Sustainability Literacy at Southern Illinois University Carbondale using the  
Assessment of Sustainability Knowledge (ASK) Scale

Major Professor: Dr. Leslie A. Duram