

PROMOTING SUSTAINABILITY LITERACY AT HIGHER EDUCATION INSTITUTIONS:
A COMPARATIVE CASE STUDY AT TEN OF THE LARGEST U.S. UNIVERSITIES

by

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ABSTRACT

All college students should experience and understand sustainability, but few universities have been able to perform an assessment of their students' sustainability literacy. This comparative case study at ten of the largest U.S. universities relies on data from AASHE STARS reports, campus sustainability websites, and interviews with sustainability staff to determine what the Universities are (not) doing to promote sustainability literacy among their students. Generally, the Universities lack sustainability learning outcomes, lack incentives for faculty to develop sustainability curricula, and have few sustainability courses. Some sustainability outreach programs are common (those related to general/integrated sustainability issues, recycling, and residence hall competitions that promote energy conservation and/or recycling) while others are uncommon (those related to water conservation, alternative transportation, and nature/wildlife). Based on these findings, I propose recommendations aimed at developing sustainability courses, creating sustainability outreach programming that incorporates uncommon themes, improving sustainability communication/marketing, and evaluating students' conceptions and attitudes using a sustainability literacy assessment.

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Introduction

This comparative case study investigates what ten of the nation’s largest universities are doing on campus to promote sustainability literacy among their students, and identifies target areas for improvement.

“Higher education’s most valuable contribution to sustainability lies in providing large numbers of graduates with the knowledge, skills, and values that enable business, government, and society as a whole to progress towards more sustainable ways of living and working” (Chalkley, 2006).

Universities should promote sustainability literacy through curricular and co-curricular efforts in order to produce environmentally-responsible and sustainability-minded graduates (Chalkley, 2006; Cortese, 2003; Thomas, 2004). By training and educating future leaders, scholars, workers, and professionals, universities are uniquely positioned to prepare students to understand and address sustainability challenges. Furthermore, engaging in sustainability issues through co-curricular experiences allows students to deepen and apply their understandings of sustainability principles

(STARS 1.2 Technical Manual, 2012). Having sustainability-literate graduates is so important that David W. Orr¹ proposes sustainability literacy as one of several criteria that should be used to evaluate and rank campus sustainability (Penn State Green Destiny Council, 2000).

Despite acknowledgement of the importance of sustainability literacy and of the need for universities to produce more sustainability-literate graduates, sustainability education is not always a high priority (Cortese, 2005; McIntosh et al., 2001; Sterling & Witham, 2008), and many graduates exit higher education without the knowledge, skills, and values to lead society down a sustainable path (Cortese, 2005). Now is an ideal time to examine what universities are (not) doing to promote sustainability literacy among their students, because “within the next ten years, the higher education sector ... will be recognized as a major contributor to society’s efforts to achieve sustainability through the skills and knowledge that is graduates learn and put into practice” (HEFCE, 2005).

This comparative case study of the ten largest U.S. national² universities asks, “What are some of the Universities’ strengths and weaknesses in terms of promoting sustainability literacy through curricular and co-curricular education, as well as communication/marketing?” I gathered data from reports, web resources, and semi-structured interviews.

I used the findings from this comparative case study to make recommendations the Universities could utilize to better promote sustainability literacy among their students. These recommendations posit that implementing sustainability learning outcomes and incentivizing the development of sustainability courses may lead to an increase in the percentage of sustainability-focused and sustainability-related courses at a given campus. In conjunction with particular improvements to co-curricular programs and communication/marketing, this may lead to a more sustainability-literate

¹ David Orr is the Paul Sears Distinguished Professor of Environmental Studies and Politics at Oberlin College. He is a scholar of climate change, environment and politics, environmental education, campus greening, green building, and ecological design. He helped to launch the green campus movement and the goal of carbon neutrality for colleges and universities (The Oberlin Project, 2013)

² A national university is one that offers a full range of undergraduate, master, and Ph.D. programs, and is committed to producing groundbreaking research (U.S. News and World Report, 2013).

student body. To evaluate this, the Universities can perform sustainability literacy assessments of their students. The findings from these assessments can then inform strategies that further promote sustainability literacy.

Background

Universities promote sustainability literacy through formal education programs and courses that address sustainability, as well as through sustainability learning experiences outside the formal curriculum. The Sustainability Tracking, Assessment, and Rating System (STARS), a program of the Association for the Advancement of Sustainability in Higher Education (AASHE), is a framework that enables universities to self-evaluate and report on their sustainability performance. Participating universities submit STARS reports to AASHE, where the reports' scores and descriptive content are made available to other AASHE institutions and the general public through the web. This form of information provision allows for transparency and accountability. At the time of this research, over 250 of the 900+ AASHE member institutions have submitted a STARS report ("Rated STARS Institutions," 2013).

Participating universities report on several categories: education and research; operations; planning, administration, and engagement; and innovation. The education and research category is further broken down into subcategories: curriculum, co-curricular education, and research. Much of my research was inspired by, and includes, STARS data from the curriculum and co-curricular education subcategories. These subcategories allow for evaluation of formal education programs and courses that address sustainability, as well as sustainability learning experiences outside the formal curriculum. Tables 1 and 2 list the credits associated with these subcategories and the possible score for each credit.

Table 1: STARS Curriculum Subcategory

Credit Title	Possible Score
Sustainability Course Identification	3
Sustainability-Focused Courses	10
Sustainability-Related Courses	10
Sustainability Courses by Department	7
Sustainability Learning Outcomes	10
Undergraduate Program in Sustainability	4
Graduate Program in Sustainability	4
Sustainability Immersive Experience	2
Sustainability Literacy Assessment	2
Incentives for Developing Sustainability Courses	3

Table 2: STARS Co-curricular Education Subcategory

Credit Title	Possible Score
Student Sustainability Educators Program	5
Student Sustainability Outreach Campaign	5
Sustainability in New Student Orientation	2
Sustainability Outreach and Publications	4
Student Group	0.25
Organic Garden	0.25
Model Room in Residence Hall	0.25
Themed Housing	0.25
Sustainable Enterprise	0.25
Sustainability Events	0.25
Outdoors Program	0.25
Themed Semester or Year	0.25

For approximately 85% of credits in both the curriculum and co-curricular education subcategories, calculations of the average score among all STARS-rated universities are >20% below the possible score. Approximately 55% are >40% below the possible score (Fig. 1 & 2).

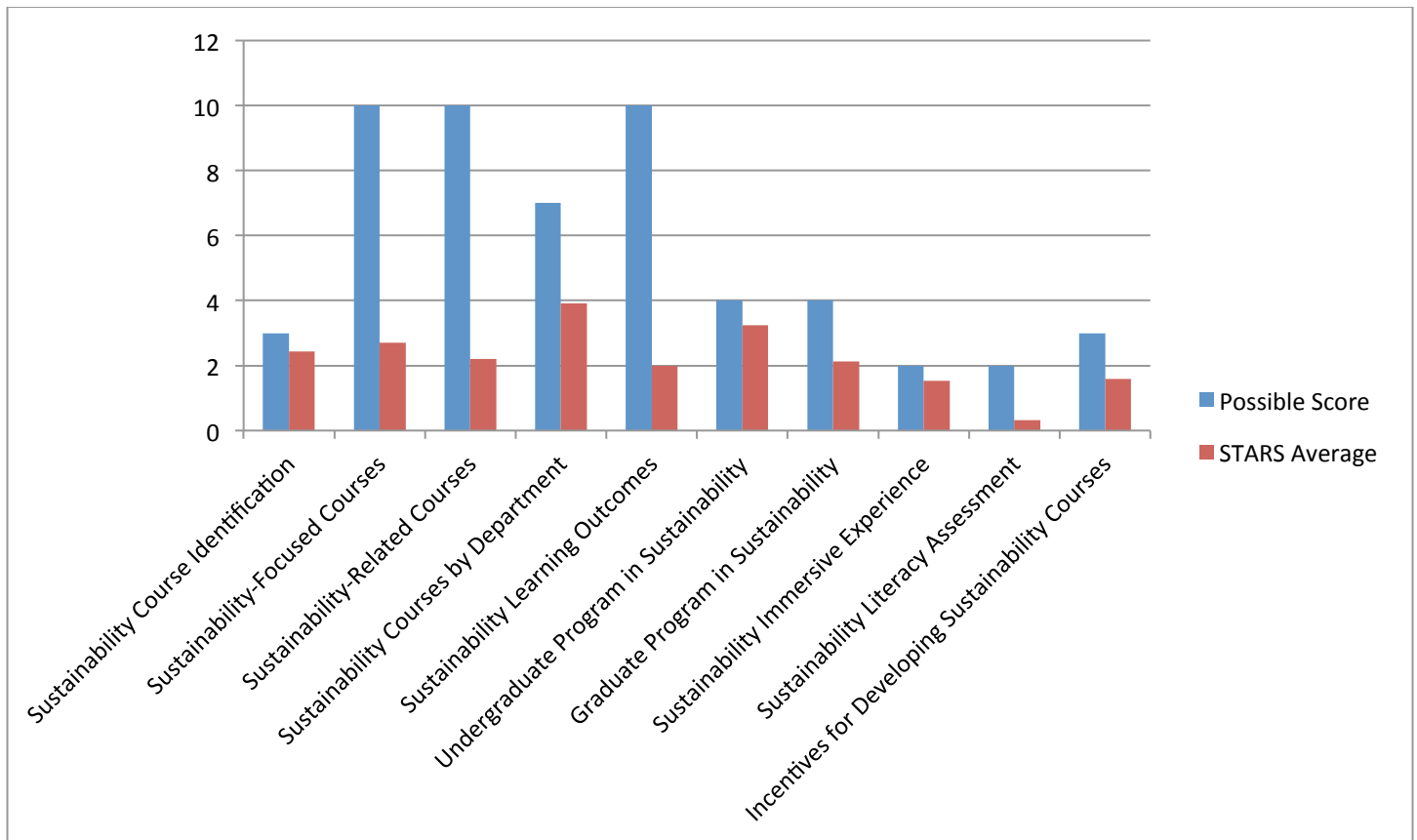


Figure 1: Possible Scores vs. STARS Average (Curriculum Subcategory)

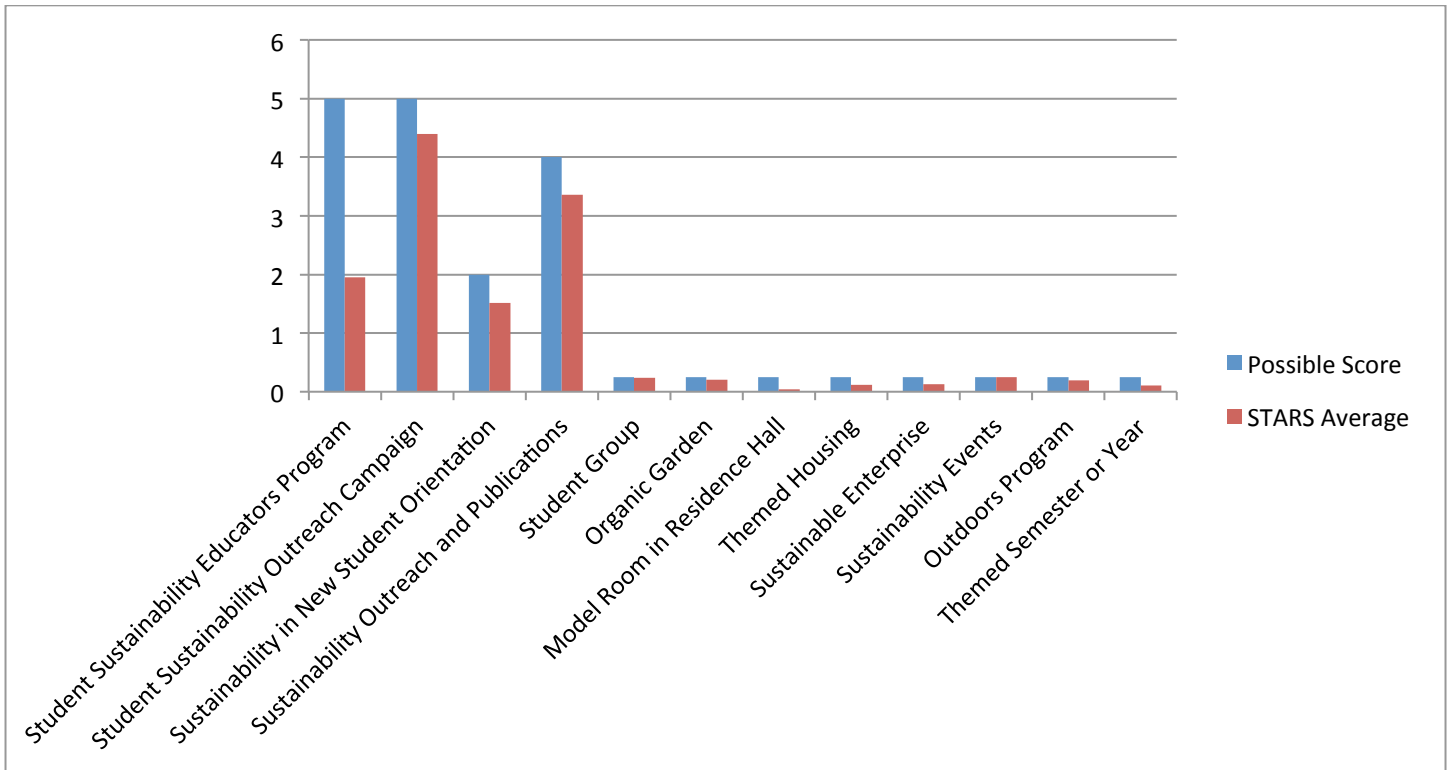


Figure 2: Possible Scores vs. STARS Average (Co-curricular Education Subcategory)

Universities use several strategies to encourage development of sustainability curricula. These include adopting sustainability learning outcomes, incorporating sustainability into general education programs, providing faculty with sustainability-related professional development opportunities, and creating sustainability certificate programs (Allen et al., 2010). Figure 1 indicates that sustainability learning outcomes are often poorly implemented or not implemented at STARS-rated universities. Figure 1 also indicates that sustainability-related professional development, at least in form of incentivized course development, is likewise poorly implemented or not implemented at STARS-rated universities. Research and discussion that hypothesizes on the causes of these inadequacies is absent from the academic literature.

Figure 1 also suggests that STARS-rated universities do not offer enough sustainability-focused and sustainability-related courses. I believe this may result from the inadequacies related to learning outcomes and incentivized course development. The linkage to sustainability learning outcomes has not received specific attention in the academic literature. However, Cowell et al. (1998) note that structural, administrative, and financial constraints can cause resistance to sustainability course development.

Thomas (2004) does, in fact, list lack of incentives for faculty members as one of the barriers to sustainability course development. He argues that sustainability courses should be easy to introduce across the curricula, but faculty may feel uncomfortable about incorporating themes from outside the strict boundaries of their discipline. Additionally, their students may view the sustainability material as additional to their core studies, and therefore not important. Other barriers to sustainability course development faced by faculty include lack of sustainability knowledge, discomfort integrating sustainability with their course content or with their discipline in general (Alabaster & Blair, 1996), feelings that integration would be too difficult or unsupported, and concern about increased demands on their time for administrative, research, and discipline-related matters (Thomas, 2004).

Some college students become sustainability-literate through specialized programs (e.g. environmental science, environmental engineering, environmental studies). But apart from occasional courses which are often elective, most college students have few curricular opportunities for sustainability education (Thomas, 2004). However, most environmental learning takes place outside of the formal curriculum, including learning that results from co-curricular experiences (Falk, 2005). Systematic research to comprehensively study these co-curricular sustainability education experiences appears to be largely absent from the academic literature, though Townsend (2005) found that environmental events or fairs are a common method used by universities to promote sustainability literacy, and programs related to recycling and energy reduction are also common. Programs related to water conservation, transportation, and land use/restoration were less common.

Methods & Analysis

This research investigates how sustainability literacy is promoted at the ten largest U.S. national universities, and does so in a broad sense by investigating some of their strengths and weakness in terms of curricular and co-curricular education, as well as marking/communication. A case study is bound by time and place and uses multiple sources of information in data collection to provide a detailed, in-depth picture of some contemporary phenomenon (Creswell, 1998). It relies on multiple sources of evidence, with data needing to converge in a triangulating fashion (Yin, 1994). A comparative case study involves compare-and-contrast analysis of multiple cases; the evidence from multiple cases is often considered more compelling and regarded as more robust in relation to a single case study (Yin, 1994).

I chose to focus on the ten largest U.S. national universities (Table 3) because they are the ones graduating the most students from undergraduate, master, and Ph.D. programs and sending them into the workforce as (hopefully environmentally-responsible) problem-solvers and decision makers.

Table 3: The 10 Largest U.S. National Universities

University	Campus Location	Total Campus Enrollment (2012-13)
Arizona State University	Tempe, AZ	60,000+
University of Central Florida	Orlando, FL	59,000+
Ohio State University	Columbus, OH	56,000+
Texas A&M University	College Station, TX	53,000+
University of Texas	Austin, TX	52,000+
University of Minnesota	Minneapolis/St. Paul, MN	51,000+
University of Florida	Gainesville, FL	49,000+
Michigan State University	East Lansing, MI	48,000+
Florida International University	Miami, FL	47,000+
Pennsylvania State University	University Park, PA	45,000+

Investigating how students at these ten Universities experience and learn about sustainability is a challenging task for several reasons. The Universities have thousands of courses, each with its unique curriculum and pedagogy that are experienced differentially by students. They are complex; they each have multiple offices and departments that address

sustainability issues from various perspectives using various strategies. They have countless initiatives, programs, activities, campaigns, special events, and organizations that address sustainability in some way, and not to mention thousands of individual students, faculty, and staff with diverse perspectives and experiences. All of these can shape how a student learns about sustainability while in college. Thus, to simplify the comparative case study, I chose to examine scores and descriptive data from the curriculum and co-curricular education subcategories of the Universities' STARS reports, then validated and expanded this data by also examining the Universities' sustainability websites and conducting interviews with their sustainability staff.

I accessed STARS reports using the AASHE website. Scores from all credits of the curriculum and co-curricular education subcategories were input into Microsoft Excel, ranked, and compared against each other and against STARS averages. Descriptive data were also pulled from the reports and coded. For example, for the Student Sustainability Outreach Campaign credit, each University's report had a description of said campaign(s). I coded these descriptions based on whether they described programs related to general/integrated sustainability, energy conservation, recycling & reducing waste, water conservation, alternative transportation, and/or outdoors/nature/ecosystems/wildlife. This same coding was done for several other credits, including Student Sustainability Educators Program, Sustainability in New Student Orientation, Sustainability Outreach and Publications, Student Group, Organic Garden, Sustainability Events, Outdoors Program, and Themed Semester or Year.

The STARS reports have some limitations. (1) They are self-reported by the participating institutions, meaning AASHE or third party researchers have not validated their content. (2) Because of their self-reported nature, some STARS data are more comprehensive, detailed, and thorough than others. Conversely, data that are absent from, minimal, or low-scoring in a STARS report do not necessarily signify that the University lacks that particular sustainability initiative or that the initiative is deficient. (3) Some of the STARS reports are over two years old, reporting data that are even slightly older. The Universities might have since updated, changed, added, or removed programs and initiatives. (4) Two Universities in my comparative case study have not submitted STARS reports at the time of my research (University of Central Florida, Florida International University³). Submission dates vary from January of 2011 to December of 2012 (Table 4).

³ Florida International University, however, is a current STARS participant and plans to submit a report later in 2013.

Table 4: STARS Report Submission Dates

University	Submission Date
Arizona State University	7/29/2011
University of Central Florida	No Submission
Ohio State University	12/16/2012
Texas A&M University	2/14/2012
University of Texas	1/31/2011
University of Minnesota	10/25/2012
University of Florida	1/31/2011
Michigan State University	4/14/2011
Florida International University	No Submission
Pennsylvania State University	7/29/2011

The Universities' sustainability websites (Table 5) typically contain information about the campus sustainability office in general (including "about us" information, contact information, and links to social media), sustainability news and recent events, sustainability programs and initiatives, sustainability resources for students, faculty, and staff, and links to related departments and organizations.

For each University's website, I navigated to all webpages that described initiatives and programs that promote sustainability literacy. I then used manual coding techniques to identify themes, anomalies, and to draw comparisons among the Universities. For example, on the University of Central Florida Sustainability website, I navigated to the "Campus Sustainability // Energy Conservation" webpage and coded the Kill-a-Watt Competition as a program that promotes sustainability literacy related to energy conservation. I also navigated to the "Get Involved // Volunteer Opportunities" webpage and coded Adopt-a-Pond as a program that promotes sustainability literacy related to outdoors/nature/ecosystems/wildlife.

The Universities' sustainability websites had some limitations, as well. (1) Some of the websites are more recent or have more regular updates than others. (2) Some of the websites are more accessible and well-designed than others. (3) Some Universities have multiple sustainability-related websites run by separate departments. (4) The websites are highly linked to external sites, including social media, academic department websites, and student organization websites, which were not included in my research.

Table 5: Sustainability Websites

University	Sustainability Website
Arizona State University	http://sustainability.asu.edu
University of Central Florida	http://www.sustainable.ucf.edu
Ohio State University	http://sustainability.osu.edu
Texas A&M University	http://sustainability.tamu.edu
University of Texas	http://www.utenvironment.org/
University of Minnesota	http://portal.environment.umn.edu/
University of Florida	http://sustainable.ufl.edu
Michigan State University	http://sustainability.msu.edu/
Florida International University	http://gogreen.fiu.edu
Pennsylvania State University	http://sustainability.psu.edu

I obtained interviews with eight of the ten case study Universities. In six cases, I conducted and recorded semi-structured phone interviews with sustainability staff persons from the Universities' sustainability offices. Interviewees were directors, program coordinators, and/or STARS liaisons and were experts on the sustainability initiatives and programs at their Universities. Interviews lasted 30-45 minutes, and interviewees responded to my questions (see Appendix) and engaged in conversation about curricular and co-curricular efforts to promote sustainability literacy among their students. I recorded the interviews and used manual coding techniques to note and organize examples of these efforts. At the conclusion of the interviews, interviewees made themselves available for future questions and follow-up. In two cases, sustainability staff persons responded to my questions via email instead of phone interview (Arizona State University, Florida International University). Staff persons from two of the Universities were unresponsive to my requests for an interview (University of Central Florida, University of Minnesota).

Table 6: Summary of Data Sources

University	STARS report	Sustainability website	Interview with sustainability staff
Arizona State University	Yes	Yes	Yes (email)
University of Central Florida	No	Yes	No
Ohio State University	Yes	Yes	Yes
Texas A&M University	Yes	Yes	Yes
University of Texas	Yes	Yes	Yes
University of Minnesota	Yes	Yes	No
University of Florida	Yes	Yes	Yes
Michigan State University	Yes	Yes	Yes
Florida International University	No	Yes	Yes (email)
Pennsylvania State University	Yes	Yes	Yes

Findings

Evidence That Sustainability Literacy Is Important to the Universities

Before identifying some the Universities' strengths and weaknesses in terms of sustainability curriculum, co-curricular sustainability education, and sustainability communication/marketing, I wanted to collect evidence that the Universities think sustainability literacy is important in the first place.

Any one of the Universities may or may not be a signatory of a formal sustainability commitment(s). Two examples of such commitments are the American College and University Presidents' Climate Commitment (ACUPCC) and the Talloires Declaration. Universities that commit to the ACUPCC agree to complete an emissions inventory, set a target date and action plan for becoming climate neutral, and integrate sustainability into the curriculum and other educational experiences of their students. Similarly, universities that commit to the Talloires Declaration agree to raise sustainability awareness and establish programs to ensure that graduates are environmentally literate and responsible citizens. Six of the ten case study Universities are signatories of the ACUPCC, and two are signatories of the Talloires Declaration (Table 7).

Additionally, all ten Universities have a sustainability office, and all of these offices have sustainability websites and social media that communicate information regarding sustainability news, initiatives, campaigns, programs, events, and resources to students, the greater campus community, and the public. All ten Universities have a sustainability committee, and all ten emphasize environmental stewardship and sustainability in their strategic plans. All ten Universities are AASHE members, and all except University of Central Florida are STARS-rated⁴ or current STARS participants⁵. Table 8 summarizes these findings.

Table 7: Formal Sustainability Commitments

University	ACUPCC	Talloires Declaration
Arizona State University	Yes	Yes
University of Central Florida	Yes	No
Ohio State University	Yes	No
Texas A&M University	No	No
University of Texas	No	No
University of Minnesota	Yes	No
University of Florida	Yes	Yes
Michigan State University	No	No
Florida International University	Yes	No
Pennsylvania State University	No	No

Table 8: Indicators That the Universities Think Sustainability Literacy Is Important

University	Office	Website	Social Media	Committee	Strategic Plan	AASHE Member	STARS-rated institution	Current STARS participant
ASU	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
UCF	Yes	Yes	Yes	Yes	Yes	Yes	No	No
OSU	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TAMU	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
UT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
UM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
UF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSU	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
FIU	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
PSU	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Signing a formal sustainability commitment may be an indicator that a University values sustainability literacy, but not signing is not an indicator that the University thinks sustainability literacy is unimportant. Despite signing or not signing, much evidence asserts that all ten Universities think sustainability literacy is important: the existence of sustainability offices with websites and social media, the emphasis of environmental stewardship and sustainability in their strategic plans, sustainability committees, and participation in AASHE and STARS.

⁴ STARS-rated institutions have submitted their STARS reports to AASHE and received their scores and ratings.

⁵ Current STARS participants are institutions currently working on submitting a STARS report (or have done so very recently).

Curriculum Initiatives & Co-curricular Programs that Promote Sustainability Literacy

Eight of the ten Universities in my comparative case study have submitted STARS reports. When overall scores from the curriculum and co-curricular education subcategories were pooled, five of the eight Universities scored above the STARS average (i.e. the average score of all 250+ universities that have submitted a STARS report). Figure 3 details these findings.

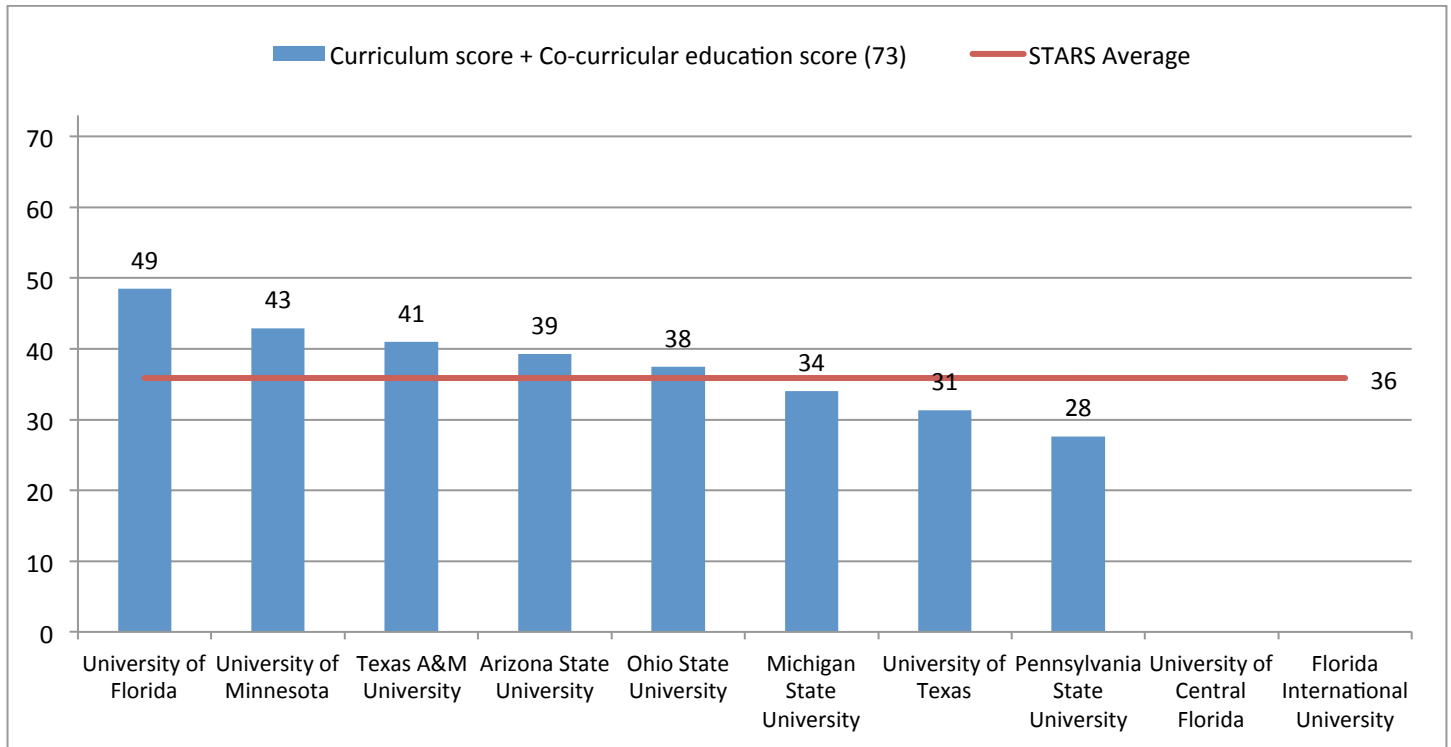


Figure 3: Overall Curriculum + Overall Co-curricular Education Scores vs. STARS Average

Curriculum Initiatives

Five of the eight Universities had an overall curriculum score that was above the STARS average: University of Florida, University of Minnesota, Arizona State University, Ohio State University, and Texas A&M University. University of Texas, Michigan State University, and Pennsylvania State University scored below the STARS average. Figure 4 details these findings.

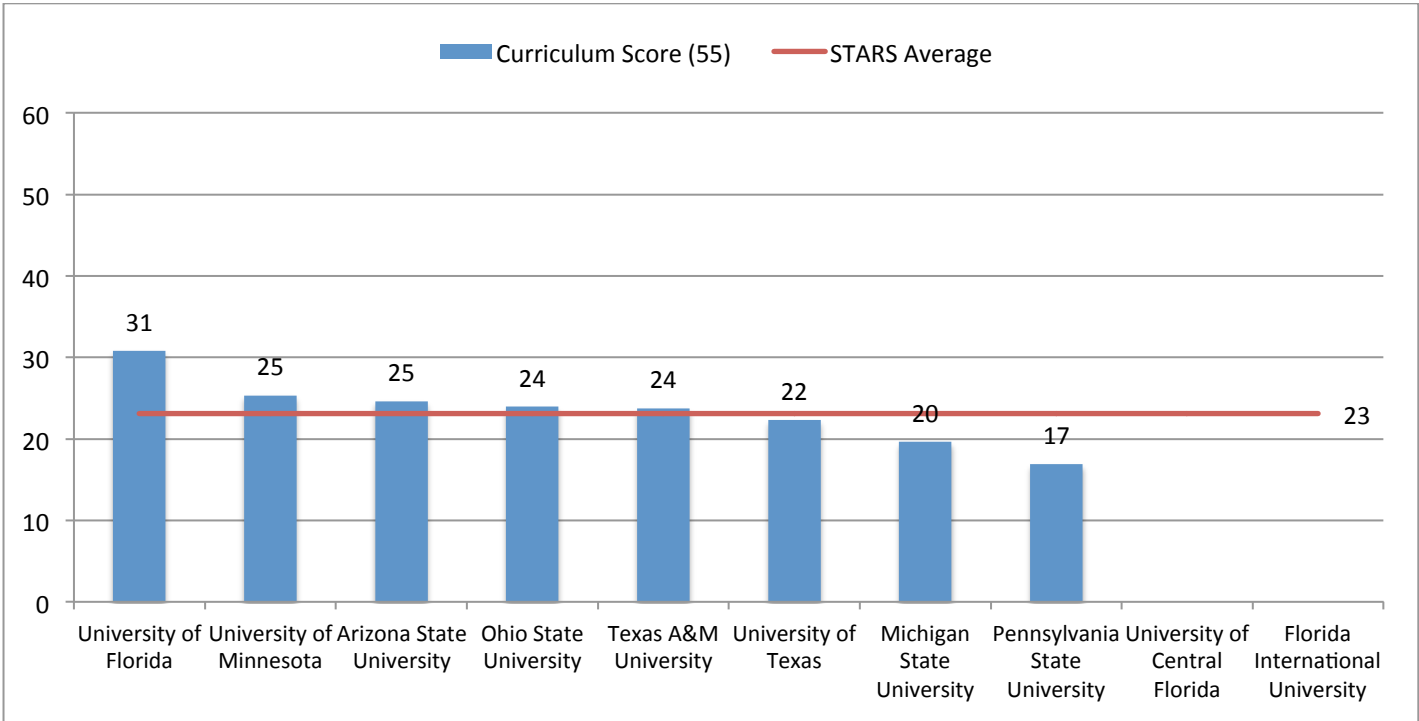


Figure 4: Overall Curriculum Scores vs. STARS Average

The following findings indicate some of the Universities’ strengths and weaknesses in terms of curricular initiatives that promote sustainability literacy among students.

Areas of Strength

All eight of the Universities have, and earned full points for having, an undergraduate program in sustainability (4 points), a graduate program in sustainability (4 points), and sustainability immersive experiences (2 points).

Five of the eight Universities earned full points for sustainability course identification (3 points): University of Florida, University of Minnesota, Arizona State University, Ohio State University, and University of Texas. Texas A&M University, Michigan State University, and Pennsylvania State University earned 2 out of 3 points for this credit. The STARS average was 2.43.

Areas of Weakness

As Figure 1 suggests, the eight Universities earned relatively few (if any) points for particular curriculum credits: sustainability learning outcomes, incentives for developing sustainability courses, and sustainability-focused and -related courses.

Sustainability Learning Outcomes

Only one of the eight Universities (University of Minnesota) had an above-average score for sustainability learning outcomes (Fig. 5). The other seven Universities fell below or substantially below the STARS average, or did not earn any points at all. This means that relatively few students at the Universities are graduating from degree programs in which sustainability is a required learning outcome.

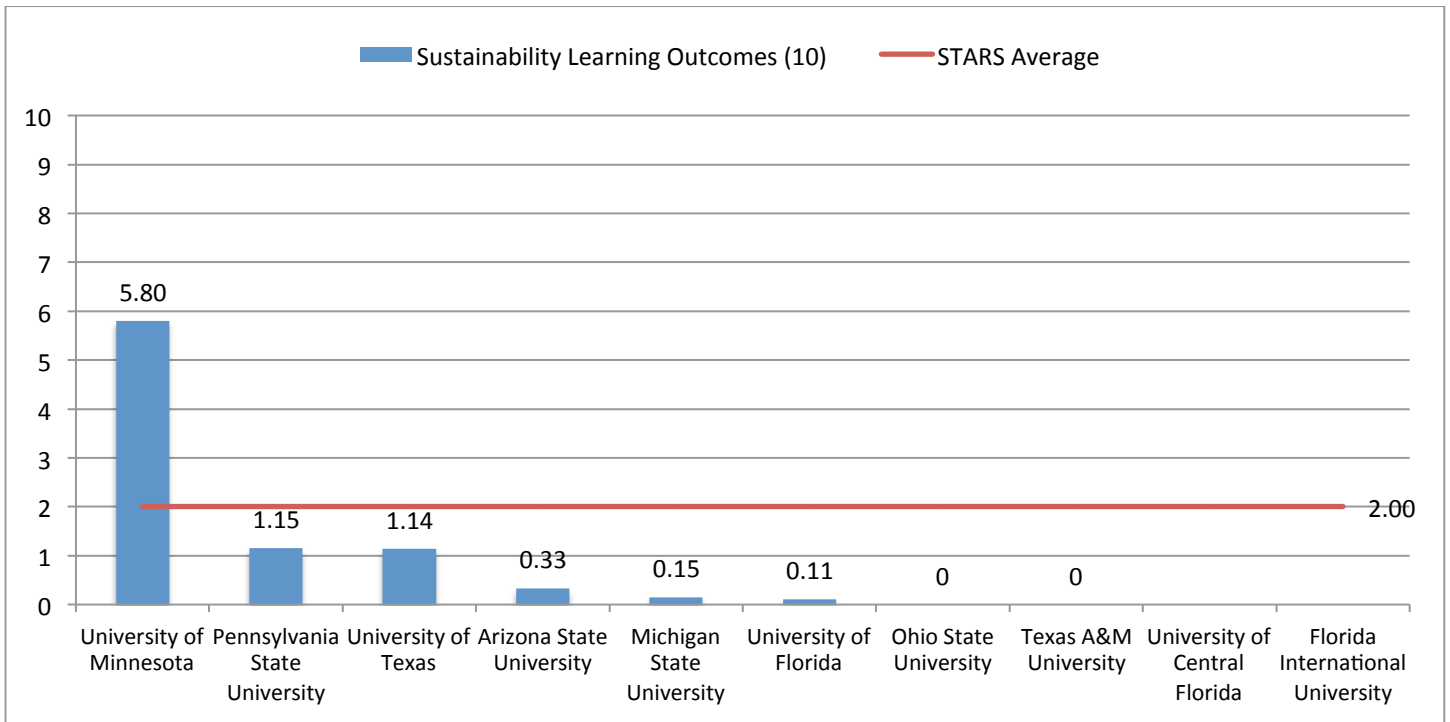


Figure 5: Sustainability Learning Outcomes Scores vs. STARS Average

Incentives for Developing Sustainability Courses

Only three of the eight Universities (University of Florida, Arizona State University, Ohio State University) earned points (3 out of 3 possible points) for offering incentives to faculty who develop sustainability courses or incorporate sustainability content into existing courses. The other five Universities did not offer such incentives, and thus earned no points for this credit. The STARS average of 1.59 indicates that roughly half of the STARS-rated institutions offer incentives for faculty to develop sustainability courses.

Thus, the Universities rarely had incentives in place that encouraged instructors – regardless of their academic department – to develop sustainability courses or incorporate sustainability content into their curricula. At Ohio State University, a program titled ‘Community on Sustainability across the Curriculum’ gave faculty the opportunity to work together to infuse sustainability into existing courses and also design new courses. Each faculty participant received \$1,000 to spend on teaching enhancement.

At University of Florida, the Prairie Project is a two-day faculty workshop in which attendees develop new sustainability courses and/or course materials. But other than the professional development opportunity afforded by the workshop itself, I argue there is not, per se, incentive for faculty to participate in this program. Arizona State University awards funding to select faculty who develop/incorporate sustainability material, but only School of Sustainability faculty members are eligible to apply. I argue that these are probably the faculty who need this incentive the least. None of the other Universities have programs in place that incentivize the development of sustainability courses or the incorporation of sustainability content into existing curricula.

Sustainability Courses

Six of the eight Universities earned below-average scores for sustainability-focused courses: Ohio State University (2.39 out of 10 points), Texas A&M University (1.78), University of Minnesota (1.71), Arizona State University (1.62), Michigan State University (1.04), and Pennsylvania State University (0.29). Only University of Texas (4.04) and University of Florida (3.40) scored above the STARS average of 2.70.

Six of the eight Universities earned below-average scores for sustainability-related courses: Michigan State University (2.10 out of 10 points), Arizona State University (2.05), University of Minnesota (1.53), University of Texas (1.06), Ohio State University (0.66), and Pennsylvania State University (0.15). Only University of Florida (5.82) and Texas A&M University (3.88) scored above the STARS average of 2.20.

When these scores for sustainability-focused courses and sustainability-related courses were pooled, five of the eight Universities scored below the STARS average (Fig. 6).

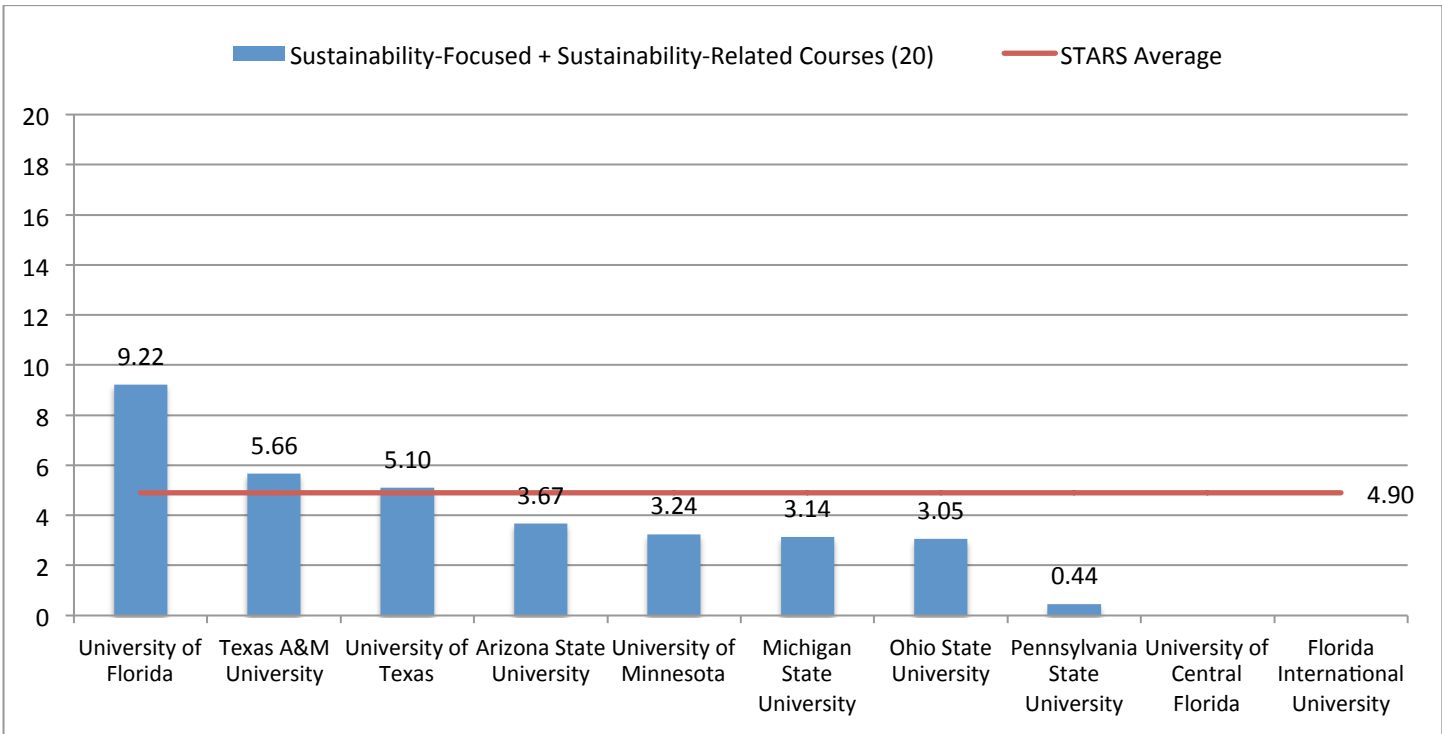


Figure 6: Sustainability-Focused + Sustainability-Related Courses Scores vs. STARS Average

Among all STARS-rated institutions, 9.2% of courses are sustainability-focused or sustainability-related. University of Florida and Texas A&M University reported percentages above this average; the other six Universities reported no percentage higher than 7.8%. Table 9, Figure 7, and Figure 8 detail these findings.

Table 9: Sustainability Courses, Total Courses

University	Sustainability-focused courses	Sustainability-related courses	Total sustainability courses	Total courses	Percentage
University of Florida	207	1,064	1,271	6,090	20.9
Texas A&M University	208	1,359	1,567	11,682	13.4
Arizona State University	120	457	577	7,429	7.8
University of Minnesota	112	321	433	5,601	7.7
Michigan State University	63	382	445	6,051	7.4
University of Texas	237	187	424	5,865	7.2
Ohio State University	320	265	585	13,406	4.4
Pennsylvania State University	38	58	96	13,240	0.7

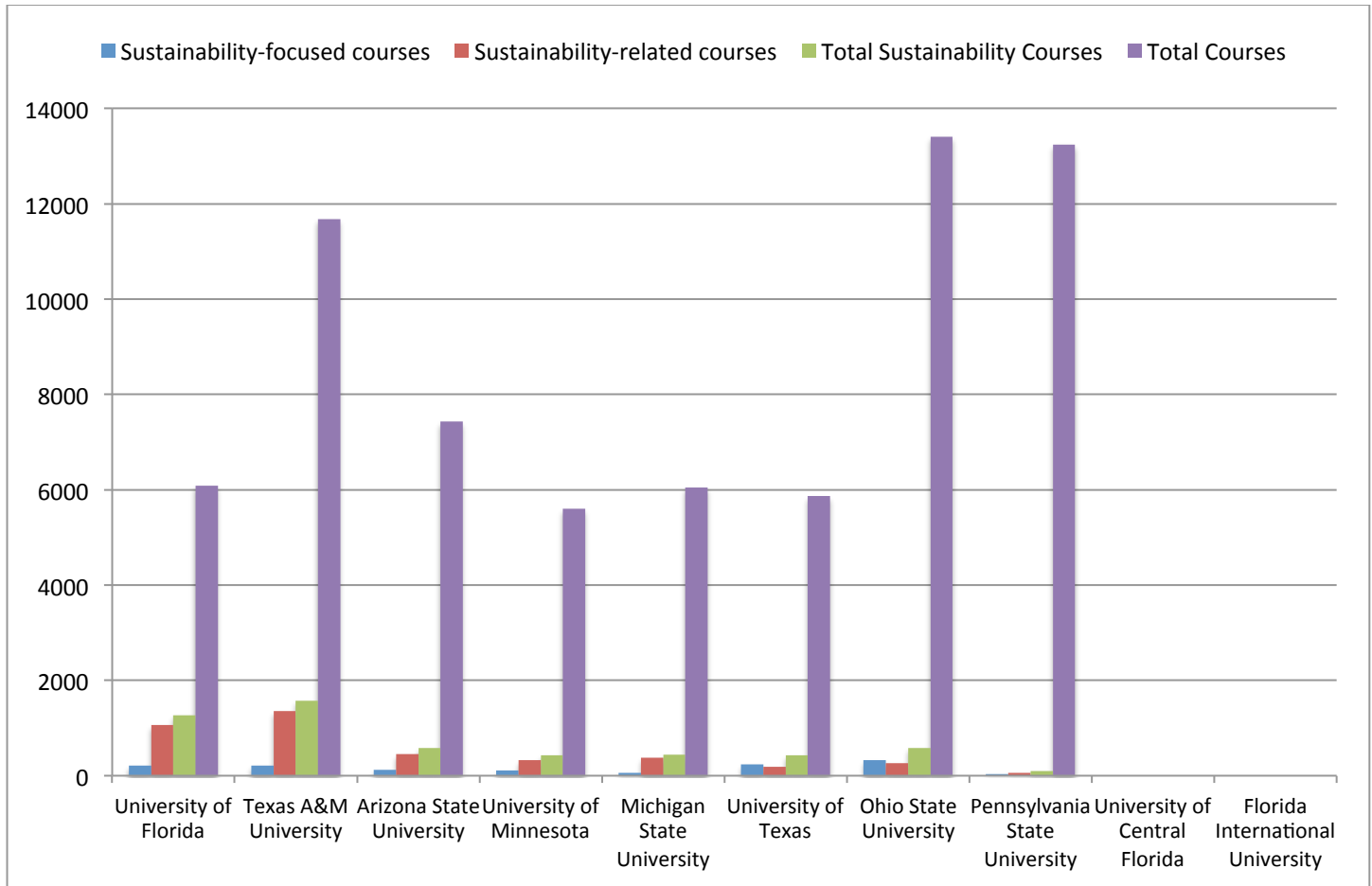


Figure 7: Sustainability Courses, Total Courses

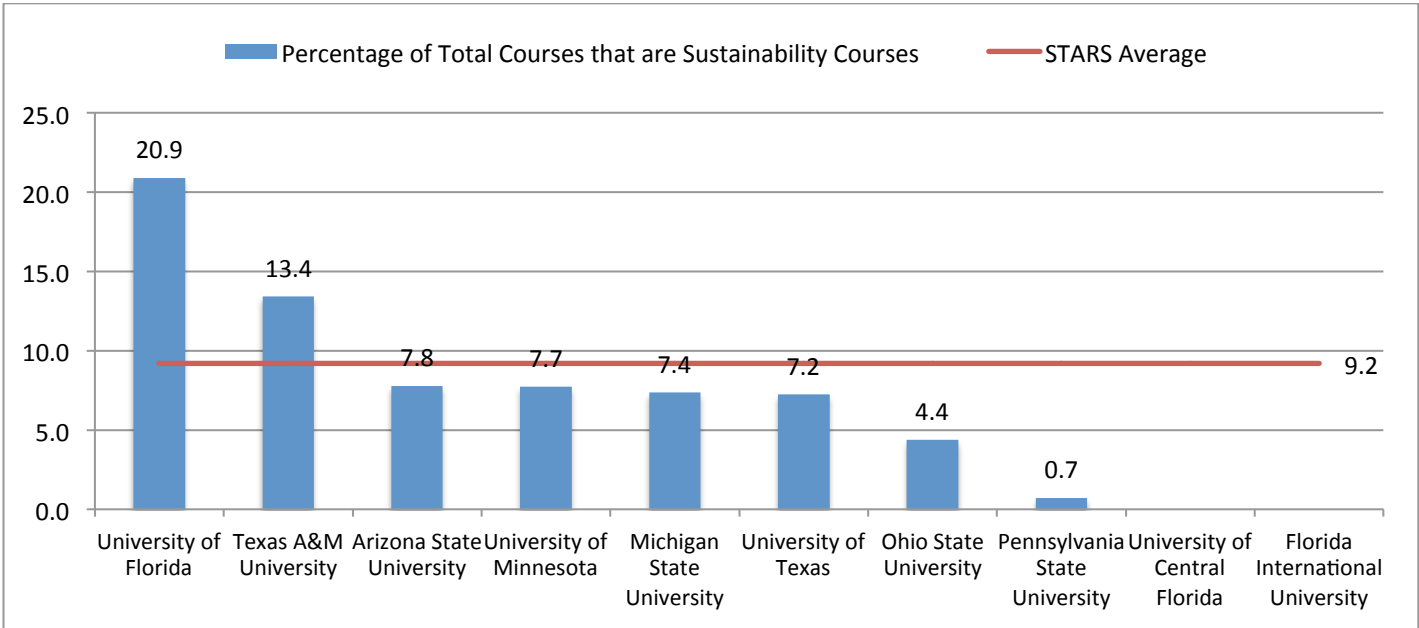


Figure 8: Percentage of Total Courses that are Sustainability Courses vs. STARS Average

The eight Universities reported an average of 1.30 sustainability courses per 100 students. Texas A&M University and University of Florida reported 2.96 and 2.59 sustainability courses per 100 students, respectively. The other six Universities reported quantities below the 1.30 average (Table 10, Fig. 9).

Table 10: Sustainability Courses per 100 Students

University	Total Sustainability Courses	Enrollment	Sustainability Courses per 100 Students
Texas A&M University	1567	49,000+	2.96
University of Florida	1271	53,000+	2.59
Ohio State University	585	60,000+	1.04
Arizona State University	577	51,000+	0.96
Michigan State University	445	48,000+	0.93
University of Minnesota	433	52,000+	0.85
University of Texas	424	56,000+	0.82
Pennsylvania State University	96	45,000+	0.21

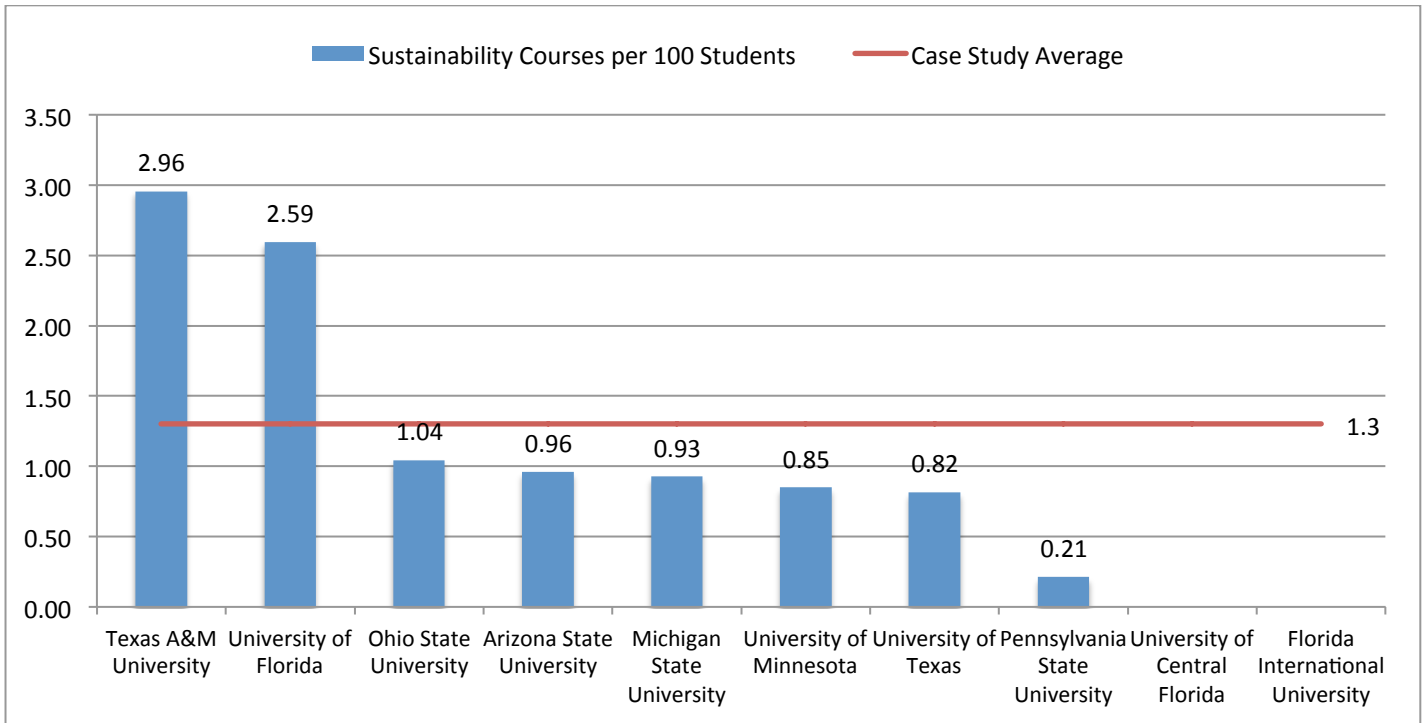


Figure 9: Sustainability Courses per 100 Students vs. Case Study Average

Sustainability Courses: Summary

University of Florida, Texas A&M University, and University of Texas had the highest STARS scores for pooled sustainability courses. However, the University of Texas was ranked sixth of eight in terms of percentage of total courses that were sustainability courses. The reason it was awarded its relatively high STARS score, though, was because approximately 4% of all its courses were sustainability-focused. No other University had a percentage higher than 3.4%.

University of Florida and Texas A&M University had high percentages of sustainability courses because 17.4% and 11.6% of their courses were sustainability-related, respectively. No other University had a percentage higher than 6.3%.

When enrollment size was factored in, Texas A&M University and University of Florida topped the list again and had a relatively high number of sustainability courses per 100 students. University of Texas, however, had the second-lowest number of sustainability courses per 100 students (due to its relatively large enrollment size).

Ohio State University, which had the second-lowest percentage of sustainability courses (due to its relatively large total number of courses), had the third-highest number of sustainability courses per 100 students after Texas A&M University and University of Florida. Pennsylvania State University had both a low percentage of sustainability courses and a low number of sustainability courses per 100 students; this was because its total number of courses was relatively large, but its number of sustainability courses and its enrollment are both relatively small.

The average number of sustainability courses per 100 students (1.30) is categorically low, and six of the eight Universities fall below this average.

These findings may be limited. The total number of courses, number of sustainability-focused courses, and number of sustainability-related courses were all self-reported by the STARS participants. Additionally, individual

Universities may have interpreted the definitions of ‘sustainability-focused’ and ‘sustainability-related’ differently, and/or they may have quantified courses using different methodologies. Also, these data may be outdated for the Universities with older STARS reports.

In brief, the Universities underperform in terms of curriculum initiatives that promote sustainability literacy among students. In particular, they lack sustainability learning outcomes and incentives for developing sustainability curriculum. Perhaps as a result, they have few sustainability-related and sustainability-focused courses.

Table 8 (Appendix) details all STARS scores of the curriculum subcategory.

Co-curricular Programs

Six of the eight Universities had an overall co-curricular education score above the STARS average. Only Pennsylvania State University and University of Texas scored below the STARS average (Fig. 10).

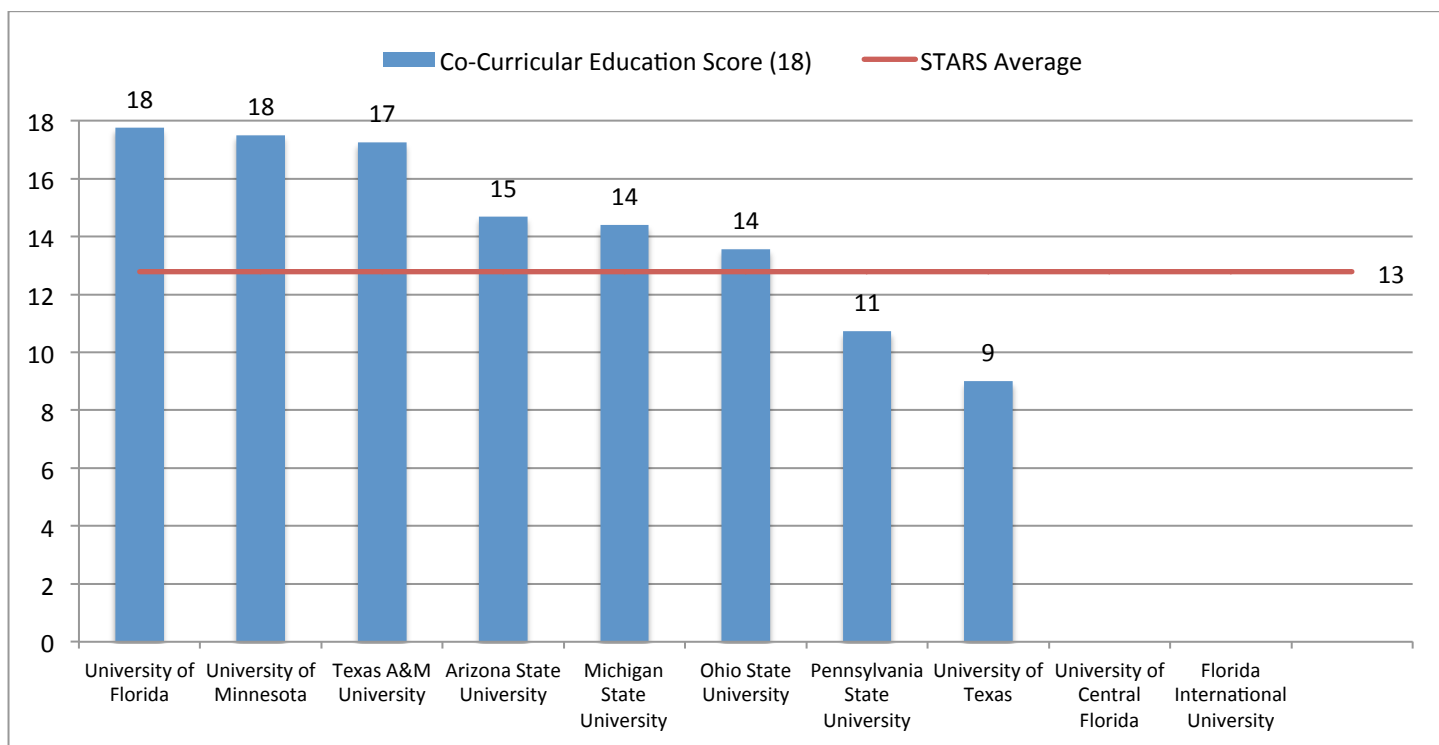


Figure 10: Overall Co-curricular Education Scores vs. STARS Average

Areas of Strength

All eight of the Universities earned full points for the following credits: student sustainability outreach campaign (5 points), student group (0.25 points), organic garden (0.25 points), sustainability events (0.25 points), and outdoors program (0.25 points).

Seven of the eight Universities earned full points for sustainability outreach and publications (4 points). Only University of Texas earned partial points for this credit (2.50 points). The STARS average was 3.36.

Six of the eight Universities earned full points for themed housing (0.25 points): University of Florida, University of Minnesota, Arizona State University, Michigan State University, Ohio State University, and Pennsylvania State University. Texas A&M University and University of Texas earned no points for this credit. The STARS average was 0.11.

Five of the eight Universities earned full points for sustainable enterprise (0.25 points): University of Minnesota, Texas A&M University, Arizona State University, Michigan State University, and Ohio State University. University of Florida, Pennsylvania State University, and University of Texas earned no points for this credit. The STARS average was 0.13.

Half of the Universities earned full points for model room in residence hall (0.25 points): University of Florida, Arizona State University, Michigan State University, and University of Texas. The other half of the Universities earned no points for this credit: University of Minnesota, Texas A&M University, Ohio State University, and Pennsylvania State University. The STARS average was 0.05.

Areas of Weakness

Four of the seven⁶ Universities earned no points (out of 0.25 possible) for themed semester or year: University of Minnesota, Texas A&M University, Michigan State University, and Pennsylvania State University. University of Florida, Arizona State University, and Ohio State University earned full points for this credit. The STARS average was 0.11.

Only three of the eight Universities earned full points (out of 5 possible) for student sustainability educators program: University of Florida, University of Minnesota, and Texas A&M University. The other five Universities earned partial points for this credit, but scored below the STARS average of 1.95: Arizona State University (1.69 points), Michigan State University (1.65 points), Ohio State University (0.82 points), Pennsylvania State University (0.47 points), and University of Texas (0.25 points).

Table 9 (Appendix) details all STARS scores of the co-curricular education subcategory.

Common Programs

The Universities commonly utilized several types of co-curricular programs to reach students and promote sustainability literacy. At least eight of the ten Universities had one or multiple day- and/or week-long sustainability-themed events or celebrations. For example, at Texas A&M University's Earth Day, campus and community organizations hosted tables while students enjoyed free food and beverages, bicycle engraving, and a "Trashion" show. At University of Minnesota's Beautiful U Day, students participated in sustainability and beautification events and attended a sustainable transportation expo (which included a bicycle sale and free bicycle tune-ups). At Ohio State University's Earth Week, students participated in the Green Lunch Series, clean-up efforts, and a topical film series. University of Florida's Sustainability Fest Day incentivized participation by advertising fun, games, prizes, information, and free food / t-shirts. At other

⁶ University of Texas was exempt from the themed semester or year credit.

universities, activities during these day- and week-long programs included recycled art displays, sustainability pledge sign-ups, and recognition of sustainable achievements of students, faculty, and staff.

All ten of the Universities had, or will soon have, student sustainability educators programs in which volunteer students implemented sustainability education initiatives on campus. Eight of the Universities had a peer education program designed to promote sustainability literacy within residence halls (e.g. Arizona State's University Housing Sustainability Paraprofessionals, Ohio State University's residence hall council Sustainability Chairs, Texas A&M University's Aggie Eco-Rep Residence Hall Program). The remaining two Universities, Michigan State University and Florida International University, are currently developing similar programs. At least six of the Universities had an additional peer education program designed to promote sustainability literacy on campus in general (e.g. University of Central Florida's Green Team Volunteer Corp, University of Texas's Campus Environmental Center Senior Officers, University of Florida's Sustainability Hut). Despite the fact that the Universities had these student sustainability educators programs that promote environmental literacy within residence halls and on campus in general, there were no similar programs that target commuter students living off campus.

Annual sustainability competitions between residence halls were also common. At least seven of the ten Universities had a program in which residence halls or residence areas competed against one another in a competition to conserve energy, reduce waste by recycling, and/or conserve water. Four of the Universities (University of Central Florida, Ohio State University, Texas A&M University, Florida International University) had residence hall competitions that measured only energy conservation. Two of the Universities (University of Minnesota, Pennsylvania State University) had residence hall competitions that measured both energy conservation and waste reduction / recycling. University of Florida's Housing Eco-Challenge was the only annual residence hall sustainability competition among these Universities that measured energy conservation, waste reduction / recycling, and water conservation. Michigan State University previously had an annual sustainability competition between residence halls, the Green Games, and its replacement program is currently being developed.

All ten Universities had at least two types of programs that exposed students to nature and the outdoors and/or promoted sustainability literacy related to ecosystems and wildlife: organic gardens and outdoor adventure trips. Other common programs included sustainability lecture series, sustainability walking tours, green certification programs, sustainability outreach tables/booths, and freshmen reading programs with a sustainability focus.

Recycling was the sustainability theme area in which the ten Universities had the most co-curricular programs. In addition to the recycling competitions that existed internally among some of the Universities' residence halls, the ten Universities also compete in external recycling competitions against one another and against other universities from across the nation. For example, eight of the ten Universities compete in the Recyclemania Tournament, an inter-institutional program that pits universities against one another to reduce waste and recycle. Only University of Minnesota and Pennsylvania State University do not compete in the Recyclemania Tournament.

Several of the Universities had student recycling ambassadors that provided recycling services and recycling education at campus events. For example, Arizona State University's Green Team was a volunteer force that provided recycling and composting services for small and large campus events. Several of the Universities had recycling

ambassador programs that promoted recycling during home football game days. At University of Central Florida, recycling receptacles were placed throughout campus for each home football game and student volunteers worked alongside vendors to collect and sort recyclable materials. Simultaneously, Green Your Game volunteers picked up recyclables in tailgate areas. Several other Universities, including Pennsylvania State University, Florida International University, University of Florida, and University of Texas, had similar programs.

At least five of the ten Universities had programs that promoted waste reduction and recycling during residence hall move-in and move-out. At Ohio State University, the Dump and Run program collected reusable items during move-out and then sold these items back to students at a yard sale the following year, with proceeds benefiting local charities. At Florida International University, the Give and GoGreen program collected reusable items during move-out and donated them to Miami Rescue Mission. These recycling and reuse programs were also present at Arizona State University, University of Central Florida, and Michigan State University.

Additionally, some of the Universities distributed reusable giveaways to promote waste reduction. Arizona State University gave new students reusable grocery-type bags during orientation, Texas A&M University distributed reusable water bottles at water bottle filling stations, and University of Florida students received reusable water bottles when they moved into their residence halls.

Uncommon Programs

Other than the residence hall competitions mentioned above that sometimes promoted energy conservation and rarely promoted water conservation, the Universities had few co-curricular programs related to these sustainability themes. Florida International University had a unique energy conservation program titled Black Out Green On in which residence hall students turned off their lights and electronics and went outside for food, entertainment, and energy awareness education. My research found no unique co-curricular programs at the Universities that promoted water conservation.

Though the Universities had informational materials that informed students about alternative transportation services such as busses and bus routes, bicycles (including racks, lanes, security, and maintenance), and carpooling and car sharing options, the Universities did not have an abundance of unique programs that promoted the use of these services. At University of Minnesota, Welcome Week scheduled its events across three distant geographical areas, allowing students to get over the initial hurdle of using alternative transportation. At University of Florida, the One Less Car initiative offered a free organic breakfast to bikers and, since One Less Car Day fell on Halloween last year, participants who used alternative transportation were encouraged to upload photos of their costumes and alternative transportation methods to social media for a chance to win prizes. At Florida International University, the FIU Bike Shop was a central location for all things “bike” on campus: bicycle and merchandise sales, bicycle maintenance and repair, safe biking education, information about local rides and events, and local and national bicycling resources.

Aside from the organic gardens and outdoor adventure trips mentioned above, and despite commonly having natural areas and nature preserves that can be used for educational and recreational purposes, the Universities had few unique programs designed to expose students to nature and the outdoors and promote sustainability literacy related to ecosystems and wildlife. University of Central Florida’s Adopt-a-Pond/Road programs focused on ecological care and

maintenance of retention ponds and campus roads. At University of Minnesota, students could take canoe rides on the Mississippi River during Welcome Week in order to experience and learn about the river. Florida International University's Tree Summit and career fair gave students the opportunity to plant trees, tour the FIU nature preserve, and hear a keynote address from an ecologist, while also networking with over 150 professionals representing various agencies, offices, and organizations.

To summarize, the Universities commonly employed a few types of programs that promoted sustainability literacy in a general and/or integrated sense. These included day- and/or week-long sustainability-themed events or celebrations, student sustainability educators programs, and residence hall competitions. The Universities also had several types of programs that specifically promoted sustainability literacy as it relates to recycling and reducing waste. These included the inter-institutional Recyclemania Tournament, student ambassador programs that volunteered at campus events and on home football game days, programs that encouraged recycling and reuse during residence hall move-in and move-out, and programs that distributed waste-reducing giveaways to students. Other common sustainability literacy-promoting programs included organic gardens, outdoor adventure trips, sustainability lecture series, sustainability walking tours, green certification programs, sustainability outreach tables/booths, and freshmen reading programs with a sustainability focus.

Less common were programs unrelated to the residence hall competitions that promoted sustainability literacy related to energy and water conservation. Also less common were programs that promoted sustainability literacy related to alternative transportation. Lastly, other than organic gardens and outdoor adventure trips, there were few programs that promoted sustainability literacy related to nature/outdoors/ecosystems/wildlife.

Summary

The Universities collectively demonstrated mediocre or poor performance in terms of curricular initiatives that promoted sustainability literacy among students, but variation existed among the STARS curriculum subcategory credits and among the individual Universities' initiatives. In terms of co-curricular programs that promoted sustainability literacy among students, the Universities collectively performed relatively better. Again, variation existed among the STARS co-curricular education subcategory credits and among the individual Universities' programs. Some particular types of programs were common among the Universities, but some were uncommon, rare, or nonexistent.

For the following STARS curriculum subcategory credits, the Universities' average scores were above the STARS average: overall curriculum score, sustainability course identification, sustainability courses by department, undergraduate program in sustainability, graduate program in sustainability, and sustainability immersive experience. Conversely, the average scores were below the STARS average for sustainability learning outcomes, incentives for developing sustainability courses, and sustainability-focused and -related courses. I ascribe these as three (perhaps interacting) weakness areas and opportunities for improvement.

University of Florida consistently had relatively high scores for the curriculum credits, with the exception of sustainability learning outcomes. Its high scores for sustainability-focused courses, sustainability-related courses, and sustainability courses by department are especially noteworthy.

University of Minnesota had variable scores for the curriculum credits. Its high score for sustainability learning outcomes is especially noteworthy.

Arizona State University and Michigan State University had variable scores for the curriculum credits.

Ohio State University had variable scores for the curriculum credits. Its low scores for sustainability-related courses, sustainability courses by department, and sustainability learning outcomes are especially noteworthy.

Texas A&M University had variable scores for the curriculum credits. Its high scores for sustainability-related courses and sustainability courses by department are especially noteworthy, as is its low score for sustainability learning outcomes.

University of Texas had variable scores for the curriculum credits. Its high score for sustainability-focused courses is especially noteworthy.

Pennsylvania State University consistently had relatively low scores for the curriculum credits, with the possible exceptions of sustainability courses by department and sustainability learning outcomes. Its low scores for sustainability-focused courses and sustainability-related courses are especially noteworthy.

For the following STARS co-curricular education subcategory credits, the Universities' average scores were above the STARS average: overall co-curricular education score, student sustainability educators program, student sustainability outreach campaign, sustainability outreach and publications, student group, organic garden, model room in residence hall, themed housing, sustainable enterprise, sustainability events, outdoors program, and themed semester or year. Only one credit's average score was (slightly) below the STARS average: sustainability in new student orientation.

The Universities offered substantial co-curricular programming that promoted sustainability literacy among students, but typically did not offer programming – or offered little programming – specifically related to energy conservation, water conservation, alternative transportation, and nature/outdoors/ecosystems/wildlife.

University of Florida consistently had relatively high scores for the co-curricular education credits, with the exception of sustainable enterprise. Its high score for student sustainability educators program is especially noteworthy.

University of Minnesota consistently had relatively high scores for the co-curricular education credits, with the exception of model room in residence hall. Its high score for student sustainability educators program is especially noteworthy.

Texas A&M University had variable scores for the co-curricular education credits. Its high score for student sustainability educators program is especially noteworthy, as are its low scores for model room in residence hall, themed housing, and themed semester or year.

Arizona State University had relatively high scores for the co-curricular education credits, with the exception of student sustainability educators program.

Michigan State University had relatively high scores for the co-curricular education credits, with the exceptions of student sustainability educators program and themed semester or year.

Ohio State University had relatively high scores for the co-curricular education credits, with the exceptions of student sustainability educators program and model room in residence hall.

Pennsylvania State University had variable scores for the co-curricular education credits. Its low scores for student sustainability educators program, sustainability in new student orientation, model room in residence hall, sustainable enterprise, and themed semester or year are especially noteworthy.

University of Texas had variable scores for the co-curricular education credits. Its low scores for student sustainability educators program, sustainability in new student orientation, sustainability outreach and publications, themed housing, and sustainable enterprise are especially noteworthy.

Communication/Marketing

Though all of the Universities have sustainability offices that communicate sustainability information and market sustainability programs through their websites, social media, etc., STARS data also indicated whether sustainability messages were communicated through campus signage and student newspapers.

Of the eight Universities with STARS reports, seven reported having food service area signage and/or brochures that include information about sustainable food systems, six had building signage that highlights green building features, and four had signage on the grounds about sustainable grounds-keeping strategies employed by the University. Arizona State University, Ohio State University, University of Florida, and Michigan State University had signage in all three categories. University of Texas and University of Minnesota lacked grounds signage. Pennsylvania State University lacked building and grounds signage. Texas A&M University lacked signage in all three categories.

University of Texas had internal building signage at its AT&T Education and Conference Center, Norman Hackerman Building and Student Activity Center, and School of Architecture. Pennsylvania State University had food service area signage in its dining halls that combated food waste, educated about composting, and identified vegetarian meals. At Ohio State University, grounds signage located in planters around the football stadium outlined the process of composting and the compost's material origins, such as pizza boxes, uneaten nachos, and other concession materials. At Michigan State University, grounds signage near campus waterways designated them as no-mow Grow Zones where animals can hide and nest.

Of the eight Universities with STARS reports, only two reported having student newspapers with a regular sustainability column or sustainability reporter: Michigan State University and University of Texas. Michigan State University reported that The State News had a newspaper reporter every semester that covered sustainability and the environment, and University of Texas reported that The Daily Texan covered sustainability and environmental programming almost weekly during the 2009-2010 school year (the school year prior to the submission of the STARS report).

Sustainability Literacy Assessment

Despite acknowledgement that having a sustainability-literate student body is important, and despite the curricular initiatives, co-curricular programs, and communication/marketing that universities employ to promote sustainability literacy among students, few universities have performed a sustainability literacy assessment. Without this sort of evaluation, we know little about how students experience and learn about sustainability and environmental issues, and whether students' awareness, knowledge, values, attitudes, and behaviors change over time.

Only two of the ten Universities have administered and analyzed an assessment of their students' sustainability literacy: Ohio State University and Arizona State University. The Ohio State University assessment was an online survey developed by revising questions from "Environmental Literacy in America" (Coyle, 2005) and conducting interviews and focus groups with experts. A pilot was tested among professors, graduate students, and undergraduate students and narrowed down to 30 (and later 16) questions. The survey measured knowledge of sustainability concepts, awareness of campus sustainability efforts, energy conservation behavior, and enrollment in sustainability-focused courses. The survey was sent via email to over 10,000 undergraduate students; the response rate was 19.3%. Students choosing to take the survey were slightly but significantly more knowledgeable about sustainability issues to begin with, and the assessment's findings represent an upper bound of the student body's sustainability knowledge. Nevertheless, the assessment's results showed a gradual and significant increase in scores according to class level (freshman, sophomore, junior, senior). Ohio State University's sustainability literacy assessment has been presented at AASHE conferences, and other schools have expressed interest in its methodology (OSU Interviewee, 2012).

The Arizona State University assessment was an online survey developed by revising questions used in surveys at other universities and by writing additional questions. An initial "test" survey was emailed to a small group of helpful students for review and feedback; the survey was then updated and finalized. In May 2011, a colorful banner with an active link to the survey was posted on the student home page. During May, students are more actively checking the home page for finals and grade information. A total of 268 undergraduate, graduate, and online-only students completed the survey. Upon completion of the survey, students could view a webpage with correct answers and resources for students to learn more about and get involved in sustainability. Students who took the survey were more likely to be generally interested in sustainability than the average student: 78% of respondents reported having either a passion for or considerable interest in sustainability. The highest response rate came from students in the School of Sustainability (a small college) and the College of Liberal Arts and Sciences (the largest college). Arizona State University has performed two of these assessments, and they have been very beneficial (ASU Interviewee, 2013).

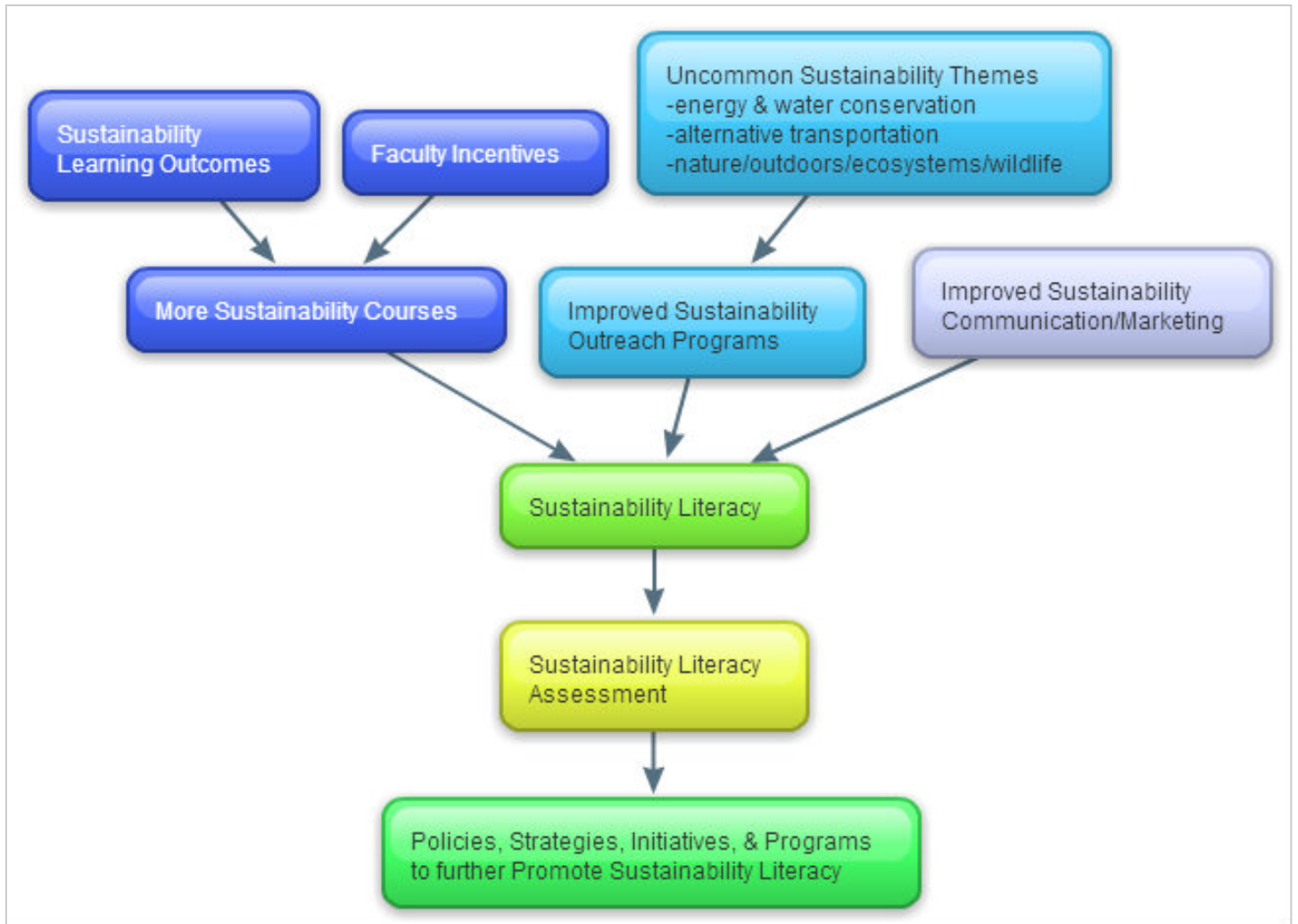
Conclusion

The ten Universities in this comparative case study demonstrate that they value having a sustainability-literate student body. They have several curricular initiatives that promote sustainability literacy among students, but often lack sustainability learning outcomes and incentives for faculty to develop sustainability courses, and, perhaps as a result, have few sustainability-focused and sustainability-related courses. They also have a variety of co-curricular programs that promote sustainability literacy among students. Often this programming targets students living in residence halls, and frequently does not include programs related to energy conservation, water conservation, alternative transportation, or nature/outdoors/ecosystems/wildlife. We know little about the impact of these initiatives and programs because the students' sustainability literacy is rarely assessed. Though this research has some limitations and opportunities exist for additional research, I hope my findings can serve as a starting point to encourage discussion and sharing among these Universities, their students, faculty, and staff, and the higher education community across the nation.

Recommendations

- Develop new sustainability courses and/or incorporate sustainability content into existing courses. The best ways to encourage this are to make sustainability a required learning outcome of degree programs and offer incentives to faculty in the form of funding, release time, etc., and to do these across all disciplines and departments. If the Universities focus on learning outcomes, faculty incentives, and (consequently) sustainability courses, their STARS scores for the curriculum subcategory, many of which are categorically low, will increase.
- Create new co-curricular programs that promote sustainability literacy related to uncommon sustainability themes and/or modify existing programs to include these themes. The Universities already have initiatives that promote sustainability literacy in a general and integrated sense, including day- and/or week-long sustainability-themed events or celebrations, student sustainability educators programs, and residence hall competitions. Furthermore, the Universities also have programs that specifically promote sustainability literacy related to recycling and reducing waste. The Universities should now consider developing unique programs that promote sustainability literacy related to energy and water conservation, alternative transportation, and nature/outdoors/ecosystems/wildlife, especially programs that reach out to those students who may not be living in residence halls.
- Improve sustainability communication/marketing. Though this could include improvements to the sustainability offices' communications (website, social media, etc.), sustainability signage (especially grounds signage) and sustainability coverage in student newspapers are additional media that may show promise.
- Evaluate students' sustainability awareness, knowledge, values, attitudes, and behaviors, and monitor how these change during the students' time in college. The Universities' will be able to use the findings from these assessments and reassessments to further improve the policies, strategies, initiatives, and programs that promote sustainability literacy among their students. These recommendations are summarized in the model below (Fig. 11).

Figure 11: Recommendations to Better Promote Sustainability Literacy



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Appendix

Table 11: Interview Guide

Do the Universities think sustainability literacy is important, based on:

- Participation in formal sustainability commitments?
- Existence of sustainability offices (with websites and social media) and/or sustainability committees?
- Whether sustainability is emphasized in their strategic plans?
- Participation in AASHE and/or STARS?

What incentives, if any, do the Universities offer to encourage instructors - regardless of their department - to incorporate sustainability concepts, issues, and examples into their curricula?

What programs do the Universities have that promote student awareness, knowledge, and behavior change related to sustainability in general and integrated sustainability issues?

What programs do the Universities have that promote student awareness, knowledge, and behavior change related to energy conservation?

What programs do the Universities have that promote student awareness, knowledge, and behavior change related to recycling & reducing waste?

What programs do the Universities have that promote student awareness, knowledge, and behavior change related to water conservation?

What programs do the Universities have that promote student awareness, knowledge, and behavior change related to alternative transportation?

What programs do the Universities have that promote student exposure to nature & the outdoors and/or student awareness, knowledge, and behavior change related to ecosystems & wildlife?

Have the Universities performed sustainability literacy assessments of their students?

Table 12: STARS Scores (Curriculum Subcategory)

University	Overall Curriculum score (55)	Sustainability course identification (3)	Sustainability-focused courses (10)	Sustainability-related courses (10)	Sustainability courses by department (7)	Sustainability learning outcomes (10)	Undergraduate program in sustainability (4)	Graduate program in sustainability (4)	Sustainability immersive experience (2)	Sustainability literacy assessment (2)	Incentives for Developing Sustainability Courses (3)
UF	30.78	3	3.40	5.82	5.45	0.11	4	4	2	0	3
UM	25.32	3	1.71	1.53	3.28	5.80	4	4	2	0	0
ASU	24.62	3	1.62	2.05	3.62	0.33	4	4	2	1	3
OSU	23.93	3	2.39	0.66	2.88	0	4	4	2	2	3
TAMU	23.75	2	1.78	3.88	6.09	0	4	4	2	0	0
UT	22.30	3	4.04	1.06	3.06	1.14	4	4	2	0	0
MSU	19.63	2	1.04	2.10	4.34	0.15	4	4	2	0	0
PSU	16.93	2	0.29	0.15	3.34	1.15	4	4	2	0	0
Case study avg.	23.41	2.63	2.03	2.16	4.01	1.09	4	4	2	0.38	1.13
STARS avg.	23.10	2.43	2.70	2.20	3.92	2.00	3.24	2.12	1.54	0.32	1.59

Table 13: STARS Scores (Co-curricular Education Subcategory)

University	Co-curricular education score (18)	Student sustainability educators program (5)	Student Sustainability outreach campaign (5)	Sustainability in new student orientation (2)	Sustainability outreach & publications (4)	Student group (0.25)	Organic garden (0.25)	Model room in residence hall (0.25)	Themed housing (0.25)	Sustainable enterprise (0.25)	Sustainability events (0.25)	Outdoors program (0.25)	Themed semester or year (0.25)
UF	17.75	5	5	2	4	0.25	0.25	0.25	0.25	0	0.25	0.25	0.25
UM	17.50	5	5	2	4	0.25	0.25	0	0.25	0.25	0.25	0.25	0
TAMU	17.25	5	5	2	4	0.25	0.25	0	0.00	0.25	0.25	0.25	0
ASU	14.69	1.69	5	2	4	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
MSU	14.40	1.65	5	2	4	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0
OSU	13.57	0.82	5	2	4	0.25	0.25	0	0.25	0.25	0.25	0.25	0.25
PSU	10.72	0.47	5	0	4	0.25	0.25	0	0.25	0	0.25	0.25	0
UT	9.00	0.25	5	0	2.50	0.25	0.25	0.25	0.00	0	0.25	0.25	Exempt
Case study avg.	14.36	2.49	5	1.50	3.81	0.25	0.25	0.13	0.19	0.16	0.25	0.25	0.11
STARS avg.	12.78	1.95	4.40	1.52	3.36	0.24	0.20	0.05	0.11	0.13	0.25	0.19	0.11