

Early Exposure to Education about Sustainability through Required First Year Seminar Classes in Public High Schools

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Executive Summary

EXECUTIVE SUMMARY

Societies need to adapt to the ever-changing world facing future generations. In order to adapt in this changing world, individuals in societies need to understand the issues plaguing the world in order to cultivate the best solutions for these issues. Education is the foundation for success in the future. The goal of this policy is to implement a required firstyear seminar course for local public high schools in the State College area. The focus right now is directed towards State College High School because of their large student body, openness towards this style of course, and their accessibility to resources.

This class will find the most success through teaching students new, relevant, and intriguing information geared towards the students. This is accomplished by understanding the students' preconceptions upon entering the course. At the University of North Texas, a survey revealed that students defined sustainability as "Environmental" 43% of the time rather than an interwoven definition of "Environment", "Sociocultural", and "Economic." At the beginning of the course, students will be given a survey which the teacher can use to understand the preconceived ideas of students at the beginning of the course. This survey will be administered again at the end of the course to measure the success of the course itself.

Other high schools across the nation know the importance of teaching their high school students about the importance of sustainable practices in society. Throughout the United States, 24% of public high schools require their students to enroll in a sustainability/environmental style course. The State College High School courses guide indicates only two upperclassmen, elective based courses that focus on sustainable practices offered to their students. These courses do not reach all students. However, in speaking with State College School District's Director of Career and Technical Education, Dr. Sharon

Executive Summary

Perry, as well as other faculty members, State High would be open to a unique and innovative course to engage students from all fields of interest.

In creating a course such as the one proposed, it is important and necessary to consider potential barriers or areas of contention that may arise. Among these are contrasting ideologies, allocation of time, misconceptions surrounding the course goals or teachings, and lack of interest stemming from these misconceptions. However, with civil discussion, open communication, collaboration with the State High School District School Board, and a clear, accurate course description, it is hoped that these barriers may be surpassed. The success of the course may also be facilitated by assurances that guest speakers will represent a wide range of disciplines, viewpoints, and ideologies, as well as engagement with students to promote the course and develop interest.

To provide useful and accurate information, the class will be structured around the United Nations sustainability goals. The United Nations have constructed a 17-goal plan focused on sustainability efforts that countries should strive to achieve. This course allows students to explore, at a basic level, all of the United Nations Sustainable Development goals through the use of guest speakers, engagement opportunities, and student-guided learning. As students progress through the course, they will develop an understanding of each goal through practical applications presented to them by guest speakers. The overall structure of the course lends itself most to UN Goal 4: Quality Education, and UN Goal 17: Partnerships for the goals.

SECTION I: UNDERSTANDING THE CURRENT STATUS

1.1 Addressing the Issue

Communities excel through development and integration of ideas founded through educated minds. Education shapes individuals into productive members of society by refining their passions. There is a plethora of ideas encompassing the minds of individuals who are unable to tap into their potential because they cannot see the opportunities they behold. For example, take Thomas Edison: his idea to create a bulb that produced light was revolutionary. His ability to create the lightbulb was fostered through his education and passion for science. Or consider the famous duo of Orville and Wilbur Wright; their brilliant minds have allowed us to travel thousands of miles in a short period of time. These entrepreneurs manufactured their ideas into realities and their ability to do so was based on the same core value: education. Educated societies show their strength with technological development, innovation, and breakthroughs. The brilliant, young minds of the future generation are currently flooding the public school systems to gain the skills and education needed to be productive members of society. It is crucial that the education systems help develop minds catered to the ever-changing dilemmas that face society. The topic of sustainability pertains to all fields of study as well as the lives carried out by all individuals who inhabit planet Earth.

Before the solutions can be addressed, the global and local problems need to be understood and made evident. According to the World Bank (2008), the world's richest 20% take part in over three quarters of the world's total private consumption (Figure 1); as developing countries become industrialized, that figure will begin to appear more equitable, but consumption will skyrocket. Nor is resource overconsumption the only issue.

Greenhouse gas emissions since the industrial revolution have sparked the greatest rise in temperature over the past 200,000 years, and the worst effects are still unknown (U.S. Global Change Research Program, 2017). Many of these consequences extend to society directly, through famine, extreme weather events, sea level rise along the coasts, and human migration at a massive scale. Meanwhile, local problems include pollution of waterways and the atmosphere, agricultural productivity and crisis, and groundwater mining. These are just a few examples of the challenges that will affect current and future generations both indirectly and directly in powerful ways.



Figure 1. Pie chart displaying socioeconomic consumption levels on a global scale. From World Bank (2008).

1.2 Students' Understanding about Sustainability

The solution to any problem can often be best solved through education. According to the U.S. Environmental Protection Agency (2014), sustainability is "the creation and maintenance for harmonious coexistence between nature and human beings of today and for future generations". However, when the topic of sustainability is presented, often the only takeaway is that it relates only to the environment and not to other segments of human activity. This was shown in a study at North Texas University by Atkinson (2007), as seen in figures 2-4. Figure 2 is a pie chart of students' ability to provide a definition of "Sustainability". The ratio of students who can define sustainability to students who cannot define sustainability is approximately 1 to 1. Figure 3 is a bar chart which displays how students defined sustainability. About 43% of students defined sustainability as "Environmental". Meanwhile, "Sociocultural", "General Living", and "Unrelated" sat below 20%. Figure 4 is a bar chart displaying methods that students believe is most effective in promoting awareness about sustainability. The most popular option chosen by the students was "Education". Based on that information, it would appear that pursuing changes in education would be an effective means of communicating and changing views on sustainability in order to promote sustainable behavior. We would suggest that early exposure to environmental and sustainability education may better equip future generations to develop solutions in the future.



Figure 2. Pie chart displaying student's ability to define "sustainability". From Atkinson (2007).



Figure 3. Bar chart displaying student definitions of "sustainability". From Atkinson (2007).



Figure 4. Bar chart displaying most effective methods to bring awareness to sustainability issues according to students. From Atkinson (2007).

1.3 Similar Programs in other Public High Schools

Early exposure to sustainable practices through required courses is not wide spread across the public school systems in the United States. There is a limited sample of schools that have seen the need and importance of education about sustainability. These states include Colorado, Florida, Hawaii, Kansas, Kentucky, Maryland, Massachusetts, Missouri, Oregon, Virginia, Washington, and Wisconsin (Chapman, 2014, p. 2). Since sustainability is a topic affecting every person inhabiting the planet, 24% of states in the United States with a structured sustainability class will not be sufficient for providing enough knowledge for future communities to sustain and excel conditions for its society. Education is the first step, but the outreach at the moment is directed towards students in STEM-related fields. A common misconception about sustainability education is that it only pertains to STEM

related fields, but sustainability touches every field of study. Therefore, implementing a required first year seminar class would reach students from all areas of interest. Students will be able to understand how their actions impact their neighbors, local environment, and lifestyle choices.

1.4 Current Courses Offered at State College High School

The current courses that touch on sustainability topics in State College High School are elective courses offered to upperclassmen who want to pursue International Baccalaureate (IB) courses. Offering classes in this manner delays exposure to these topics and excludes students who do not choose to pursue IB courses. The specific courses are IB Economics and IB Environmental Science, with course descriptions available in Appendix B. State College High School offers hundreds of classes, yet only two classes touch on sustainability, a topic that could impact every student. Since these science classes are chosen by each student out of a variety of choices, students who choose other elective courses will not be exposed to sustainability topics discussed in this class. Based on State College High School's current set up, the students exposed to these topics are those who are upperclassmen and planning to attend college or university. By this point in their education, many students have already chosen the general direction they plan to go with respect to their future education and career. This results in a significant decrease in the variety of students exposed to sustainability topics. Moreover, in order to progress as a society to meet the United Nations goals, all citizens need to be exposed to the issue as well as solutions, implying that graduates of college and university should not be the only focus of sustainability education.

1.5 Interview with Dr. Sharon Perry

Director of Career and Technical Education, State College High School

Sharon Perry, Director of Career and Educational Education at State College Area High School, provided detail with regards to the current programs and support in place for sustainability-minded education within the school district. She was also able to speak about the student body's general attitude towards sustainability and willingness to engage in programs supporting sustainability. State College Area School District (SCASD) has committed to the advancement of environmentally sustainable initiatives throughout the district, ranging from the structural components of their buildings, to the amenities provided within them. For example, the School Board has committed to build and maintain at least Silver Rating LEED Buildings for all of their current and future academic building renovations. Also in their new buildings is a new recycling program, which is a vast improvement from their previously non-existent method of collecting and sorting waste and recyclable materials. Additionally, Dr. Perry cited amenities such as their water bottle filling stations, designed to limit single-use plastic bottles, and motion activated lighting, designed to limit unnecessary energy consumption, as intentional decisions made on the part of the district to limit their carbon footprint and energy consumption. In doing so, she explained, they lead students by example. Encouraging students to engage with their environment in ways that are concerned with ensuring its future existence and safety, sustainability is integrated into their lives each day and builds a foundation for sustainable practices as they begin to become more autonomous and are faced with choices regarding sustainability.

In addition to building structure and amenities, State High incorporates sustainability into the classroom as part of many educational programs. For example, in agricultural

science courses, students are directed in discussions regarding production sustainability, the effects of methane gas, the benefits and detriments of genetically modified organisms, and the ethics and best practices of raising livestock. In career programs such as automotive or construction, the safe and environmentally sustainable practices of central elements to these careers, such as disposal of fluids or treated woods, are also emphasized as a regular part of instruction. Ethical dilemmas involving the effects of sustainable practices, whether they be economic, health-related, or a variety of other aspects that are not commonly agreed upon, are also part of these student discussions in the classroom. In general, Dr. Perry emphasized that they teach students that sustainability is beneficial when done correctly, collaboratively, and thoughtfully.

Dr. Perry also discussed the administrative perspective of sustainability initiatives at State High. She emphasized the importance of communicating to faculty and staff what the environmental impact of the buildings they sit in or actions they partake in means for the future, and the function of sustainability in everyday life. In particular, she noted that it generally takes more explaining and time to adapt to newer, sustainable practices for some faculty simply because it's never been part of their everyday life, and they don't necessarily see the importance of making small changes for a larger impact. She discussed that some faculty didn't understand at first how having lights that were motion activated or on a timer made any difference in environmental impact, but in general did not seem too fazed by these small changes, as they don't inconvenience anyone to the point that they become a nuisance. She cited students as one of their biggest teachers in this aspect, saying that their innovative ideas and openness to adapting for the sake of sustainability emphasizes to the "older generation" why these practices are important, necessary and rising in prevalence. Dr. Perry

feels that SCASD is ahead of the curve in the context of public schools because of their willingness to make larger upfront financial commitments that pay off overtime, and desire to integrate sustainable ideas and education into the classroom. She acknowledges, however, that their ability to do so in large part is due to the large size and subsequent high amount of funding that the school receives that allows them to kickstart these initiatives and education. If this program were to be implemented in schools with a different demographic and economic makeup than State High, she predicted that it could be more difficult and would require additional funding from external sources. For schools struggling to make ends meet while conducting basic, core, educational courses, they may be less open to adding additional instructional material and time to something that they don't see as valuable as math, science, English, or other components of basic education. State High School, then, makes a perfect fit for this program, because new ideas and techniques can be tested without the financial constraints that may be found at different schools, and the initial course test at State High can be adapted for use in schools of different makeups.

1.6 Barriers with Additional Course and Stakeholders

The benefits of educating students about sustainability are apparent, but there are barriers when trying to add a course that is a requirement for students. These barriers stem from faculty availability to resentful and angry parents. Table 1 displays the stakeholders along with benefits and negative aspects that should be considered when implementing a required course into State College High School's curriculum.

Table 1. List of stakeholders along with positive and negative aspects that must be considered.

<u>Stakeholders</u>	<u>Negative</u>	<u>Positive</u>
<u>School District</u>	• Need to hire additional	• Set an example for surrounding
	qualified professionals	districts (publicity) of forward
	• Create space for the	thinking
	class in first year	
	schedules (once per	
	week)	
Faculty members	• Allocating time to an	• Teachers who monitor this course
<u>I acuity members</u>	evtra class if they	an gain now perspectives and
	extra class if they	can gain new perspectives and
	decided to be assigned	knowledge from speakers and
	to this class	students
		• Building connections with students
		during a transformative transition
		period of their life

<u>Students</u>	• Loss of a study once	• Knowledge that can impact and
	per week	guide lifestyle and professional lives
	• Political Ideologies	• Give students the ability to impact
	could skew students'	surrounding communities
	interest in course due	• Building friendships with their peers
	to misconceptions	at the start of their high school
	about sustainability	career
	education	
Parents	Potential to disagree	 Students will bring home knowledge
<u>1 ui ciito</u>		• Students will omig nome kilowedge
	with the facts of	that the parents and family could
	with the facts of sustainability that will	that the parents and family could integrate into their daily lives
	with the facts of sustainability that will be presented in this	 that the parents and family could integrate into their daily lives Learn more about sustainable efforts
	with the facts of sustainability that will be presented in this course	 that the parents and family could integrate into their daily lives Learn more about sustainable efforts that they otherwise might not be
	with the facts of sustainability that will be presented in this course	 that the parents and family could integrate into their daily lives Learn more about sustainable efforts that they otherwise might not be exposed to

The barriers that this policy may face in the students' and parents' views can easily be discussed, and potentially restructured, through a public forum. Students and their parents can hear about the prospective class and ask questions pertaining to their concerns. The purpose of the course is not to dive into political stances, but instead provide factual evidence and provide resources to students to better help them understand what is means to be sustainable. The students will be presented with information of current action that is being taken in the Borough of State College and at Penn State University Park. Through civil

discussion, the parents and students could gain a full understanding about the purpose of the course. The negatives aspects that the school district may be concerned with can be resolved as well. Since students already have study halls built into their school day, the weekly sustainability seminar for the first year can easily be allocated to one of those study hall periods. The concern about hiring additional faculty members can be addressed by first talking to current faculty. Current faculty will be given the opportunity to teach this unique course first. It is not foreseen that multiple additional faculty, if any, will need to be added as a result of implementing this course. This class is designed in a way that the mandated teacher of the course is present for conventional purposes, but a majority of the teaching is to be done by the qualified speakers.

SECTION II: RECOMMENDATIONS

2.1 Brief Overview of Course

To promote early education about sustainability, our proposition is to implement a required first year seminar class focusing on sustainability. This one semester course would ideally meet once per week during the students' study hall. The objective goals of the class are to look at global and local issues through the use of qualified guest speakers, address each of the UN sustainability goals, show students how to integrate different aspects of sustainability into their professional and personal lifestyles. Before the class begins, a survey can be administered to help the teacher appropriately guide the class discussions based on the interest of the students, the culture/experiences of the students, and understand the students' general understanding upon entry into the course. Figure 5 displays an example of a survey that can help teachers appropriately structure course so it is the most beneficial for the students, which is further discussed in Appendix A. The required assignments are simply graded based upon the effort put forth by the student. The assignments would include Journal entries and an end of semester project. Journal entries can be completed after each discussion and the student can answer questions along the lines of:

- 1. What was discussed that surprised you?
- 2. What new information did you learn during the discussion?
- 3. What lingering questions do you have?
- 4. How can you implement change into your lifestyle/professional choices to maintain a sustainable lifestyle?

The end of semester project allows the students to really engage with their interests. Students can choose to do an individual or group project that incorporates what they have learned throughout the entity of the course. Projects can include but are not limited to; building replica models, writing a paper/poetry/song, or creating a video. Each project should touch upon the UN goals as well as emphasize the importance of sustainability. A sample schedule that can be implemented into State College High School is shown in section 2.2 below.

Q1	I would define a more sustainable world as (select all that apply):
4	No Poverty
	Industry, Innovation, and Infrastructure
	Reduced Inequalities
	Sustainable Cities and Communities
	Decent Work Economic Growth
	Affordable and Clean Energy
	Gender Equality
	Good Health and Well-Being
	Climate Action
	Zero Hunger
	Life on Land
	Peace, Justice, and Strong Institutions
	Partnerships for the Achieving Sustainability
	Responsible Consumption and Production
	Quality Education
	Clean Water and Sanitation
	Life Below Water
Rate the	e following statements (1 star being strongly disagree to 5 stars being strongly
Recycl	ing is important because it is one way each person can help and save the planet.
	Recycling is important because it promotes a self-sufficient society. \checkmark
	The economic well-being of communities is more important that combating climate change. $\swarrow \checkmark \bigstar \checkmark \checkmark$
Coml	bating climate change is important because it shows compassion for

Figure 5. An example survey that can be administered to the high school students to help teachers appropriately structure the course. See Appendix A for more information.

2.2 Sample Schedule

Week	Daily Plan	UN Goals	Homework/Assignments/ Reflection
#	Description of Class Activity Suggested Speaker for Each week's UN goal	UN goal of focus	Assigned work for student
1	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Tiana Jones: The Lion's Pantry	 No poverty Zero Hunger Good Health and Well-being 	Journal
2	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Audra Hixson: Penn State's Gender Equity Center	5: Gender Equality 10: Reduced Inequalities	Journal
3	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Brandi Robinson: Penn State's College of Earth and Mineral Sciences	 13: Climate Action 14: Life Below Water 15: Life on Land 	Journal
4	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Erin Baumgartner: Penn State's UNICEF President	16: Peace and Justice Strong Institutions17:Partnerships to Achieve the Goals	Journal

5	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week	9: Industry, Innovation and Infrastructure 11: Sustainable	Journal
	Dr. Peggy Johnson: Penn State's Schreyer Honors College & Civil Engineering	Cities and Communities	
6	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Dr. Erica Frankenberg: Penn State's College of Education	4: Quality Education	Journal
7	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Bernard Hoffnar: State College Borough Water Authority member	6 : Clean Water and Sanitation	Journal
8	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Jeffrey Brownson: associate professor of Energy and Mineral Engineering at Penn State	7: Affordable and Clean Energy	Journal
9	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Ken Korbich: Penn State's Human Resources	8: Decent Work and Economic Growth	Journal

10	Qualified Speaker to lead a discussion about local/global issues pertaining to UN goals for this week Deborah A. S. Hoag: State College's Compost Public Works Director	12 : Responsible Consumption and Production	Journal
11	Time for independent/group work of projects	Students begin brainstorming which UN goal they will focus on; form groups	Journal
12	Time for independent/group work of projects	Students should integrate 1 UN goal into projects	Idea Report Assigned
13	Thanksgiving Break (documentary day for students who have class)	Students should integrate 1 UN goal into projects	Idea Report Due; Progress Report Assigned
14	Students work on independent/group projects	Students decide the goal they will focus on and begin research	Progress Report Due
15	Present student projects	Non-presenting students fill out UN Goals Log	Reflection paper assigned
16	Present student projects	Non-presenting students fill out UN Goals Log	No Assignment
17	Christmas Break (documentary days for students who have class)	Students should integrate UN goals into projects	Reflection Paper Due

In addition to the class, optional weekend field trips pertaining to the topics discussed during the class will be available to all students. Field trips can include but are not limited to; visiting local universities to hear from sustainability speakers and the universities efforts, and visit local/state government to hear about efforts being made to promote sustainability within the community. These weekend field trips would allow students to see first-hand the efforts that their community is making in order to address climate change and promote sustainability. The students would have the opportunity to participate in hands on work and make a tangible difference, creating a sense of belonging to the community. Example field trips include; trips to local power plants to tour the facilities, visiting local streams and rivers with a professional from DCNR to teach students about the how their lifestyles impact local ecosystems through watershed systems, visiting local farms to learn about rural agriculture and how farmers find the balance between economically and ecologically benefiting ways of cultivating their crops, and visiting local and state government offices to hear about the city and state efforts in progressing towards a more sustainable future.

It should be noted that local issues are an integral part of the course. For students who may not be interested originally in large-scale, seemingly abstract concepts such as resource depletion or global climate change, tying in local issues may prove to be engaging. For example, a lesson on UN Goals 6 and 12 (Clean Water and Sanitation, Responsible Consumption and Production) may deal with acid mine drainage in coal-producing areas of the country, and how it impacts local streams and waterways, and the activities that rely on those resources. Another example could be artificial eutrophication as a result of excess fertilizer use, which ties directly into UN Goals 2 and 14 (No Hunger, Life Below Water). It also impacts many landowners in the State College area, particularly with government

oversight with regard to nonpoint source pollutants entering the Chesapeake Bay Watershed, and could provide a tangible link between students and the UN SDGs.

2.3 United Nations Goals Addressed

The nature of the course allows students to explore, at a basic level, all of the United Nations Sustainable Development Goals. As students' progress through the course, they will focus on a different goal or goals each class through practical application by guest speakers. Students are encouraged to learn each goal through active engagement and examination of real-world issues, solutions, and ideas. Given the course is modeled in State College High School, many of the speakers we have proposed are actively involved in Penn State University academic or community engagement programs. The course as a whole, in the way that it is structured and the overall goals, relates directly to UN Goal 4 (Quality Education) and UN Goal 17 (Partnerships for the Goals).

As a seminar course, the aim is to provide a foundation and introduction to the concepts, issues, solutions, and other aspects related to sustainability. One of the targets within Goal 4 (Quality Education) strives to, by 2030, "ensure that all learners acquire the knowledge and skills needed to promote sustainable development," going on to emphasize one aspect of this as "education for sustainable development and sustainable lifestyles" (United Nations, 2016a). This goal also highlights recognition of global citizenship as a means of contextualizing the absolute necessity for sustainable development. Through this course, students will be exposed not only to the issues at hand in a particular context to which they can relate, but will also be required to think critically and thoughtfully about potential solutions to them. They will, through the speakers brought into the classroom, educational experiences, and collaboration with their fellow classmates, come to a better overall understanding of what sustainability is and how they can engage in sustainable methods of living. Exposure to real-world applications of these practices in their own

communities will have a greater impact than simply showing them the large scale, future impact in a way that they cannot relate to. By showing students the everyday aspects of sustainability present in the professions of their parents and neighbors, in how the food they eat is produced, and in so many other small ways that have a large daily impact, the idea of living sustainably will be emphasized even more. In practicing sustainable methods in their own lives, it will aid in the transition to promotion of these same ideas and tactics in the lives of others, with the intention that the student will incorporate their understanding of sustainability into all aspects of their continued living and learning in the global community.

As the course will include instructional material regarding each of the UN Sustainable Development goals, students will be encouraged not to simply sit in class and listen, but to strive for achievement of these goals through collaboration and partnership with others. In this particular setting, it will be smaller scale partnership; tasks such as completing their final projects together or encouraging each other to live more sustainably. This sets a foundation, however, for future partnerships on a larger scale. Goal 17 lists its targets as various collaborations between large corporations, non-profits, those who develop new technologies, governments, and all others who can make an impact in achieving these goals of sustainable development (United Nations, 2016b). Showing students partnership among local leaders, businesses, educators, and other community members emphasizes that collaboration by multiple parties, even if they have varying viewpoints or perspectives, is not only possible but necessary and beneficial. By exposing these students to the idea of collaborating and partnering to achieve these goals, despite different interests and approaches to doing so, as they enter their continuing education, the workforce, or wherever their path may take them, this becomes an everyday part of their working relationships. As these future leaders grow

and continue learning, they can be the catalyst for innovative partnership and collaborative work that continues to strive towards a more sustainable world.

APPENDIX A: SAMPLE SURVEY QUESTIONS

These are anonymous surveys. No identifying information will be collected.

Sustainability mostly pertains to (select all that apply):

- 1. No Poverty
- 2. Industry, Innovation, and Infrastructure
- 3. Reduced Inequalities
- 4. Gender Equality
- 5. Sustainable Cities and Communities
- 6. Good Health and Well-Being
- 7. Decent Work and Economic Growth
- 8. Affordable and Clean Energy
- 9. Climate Action
- 10. Life Below Water
- 11. Zero Hunger
- 12. Life On Land
- 13. Peace, Justice, and Strong Institutions
- 14. Reduced Inequalities
- 15. Clean Water and Sanitation
- 16. Responsible Consumption and Production
- 17. Partnerships for the Goals

CONTINUE

For questions 1-4, please rate the following statements from 1 (strongly disagree) to 5 (strongly agree). This is *not* testing factual information, but rather your agreement with the reasoning presented. *There are no right or wrong answers*.

- 1. Recycling is important because it is one way each of us can help and save the planet.
 - a. [Individualizing Appeal, RC&P]
- 2. Recycling is important because it promotes a self-sufficient society.
 - a. [Binding Appeal, RC&P]
- We shouldn't work towards preventing climate change if it will hinder the economic well-being of our communities.
 - a. [Binding Appeal, Climate Change]
- Combating climate change is important because doing so shows compassion for others who will be affected.
 - a. [Individualizing Appeal, Climate Change]

For questions 5 and 6, please choose AGREE or DISAGREE for the following

questions. There are no right or wrong answers.

- 5. I would throw a piece of litter on the ground if my family told me to do it (nobody else would see me do it).
 - a. [Authority (binding) against Harm (individualizing), Life on Land/RC&P]
- I wouldn't shoot the last individual of an endangered species even if it meant my community would exile me.
 - a. [Harm (individualizing) against Ingroup (binding), Life on Land]

END

Appendices

Discussion and Notes on the Survey:

Rating questions 1-4 above are modeled after Kidwell, Farmer, and Hardesty (2013). Questions 5 and 6 are modeled after Graham, Haidt, and Nosek (2009). Individualizing appeals correspond to the *harm/caring* and *fairness* moral foundations and best fit liberals. Binding appeals correspond to the *ingroup loyalty*, *authority*, and *purity* moral foundations and best fit conservatives (Graham et al., 2009).

Dilemmas and appeals involving purity were not used because various varieties of purity may be accepted by liberals and not conservatives, and vice versa. For example, an impulse to undertake actions to keep nature pure would best fit the *purity* moral foundation (Graham et al., 2009) but it would be expected for liberals to be the most likely to ascribe to it as opposed to conservatives (e.g., Kidwell et al., 2013). This may be due to the confounding variable of discrete ideology, e.g., ecocentrism vs. anthropocentrism or theocentrism, among others (Kneese & Schulze, 1985).

This survey was designed as a basic diagnostic tool to assess the usefulness of multiple appeals in environmental education. It is *not* designed to replicate in total what has already been done by Kidwell et al. (2013), but rather to determine if a local school or another population would be better served by congruent appeals. It is also not designed to demonstrate the moral framework for a population regarding topics unrelated to environmental education, though it may provide some clues. If the goal is to provide a more general picture of the various moral frameworks at play in a given population, the YourMorals.org assessment (Ditto et al. [2019], based on Haidt and Graham [2007]) is recommended.

Appendices

It is to be expected that the more morally-diverse a population, the greater the likelihood that varying congruent appeals are required to achieve the same behavioral change; in a population that shares very similar moral frameworks, the necessity of different appeals is not as necessary. For example, a population that overwhelmingly holds to a religious ethic could utilize resources from their beliefs regarding the environment, such as those described in Hitzhusen (2007) for holders of Judeo-Christian ethics. It should also be noted that most environmental education has assumed a neoliberal moral framework (Hursh, Henderson, & Greenwood, 2015), suggesting that populations that do not favor neoliberalism as a framework would be less open to environmental education as currently practiced. However, this is less likely a problem in the United States and may be more of a concern in the non-Western world.

APPENDIX B: CURRENT SUSTAINABILITY COURSE DESCRIPTIONS

Course descriptions taken from State College Area School District (2019).

IB Economics SL

- Suggested Grade Level 11-12; 1 Credit
- "The IB Economics course is a study in both macroeconomics, with an emphasis on applying economic concepts and theories to real-world issues. Prominent among these issues are fluctuations in economic activity, international trade, economic development and environmental sustainability. Additionally, students will engage in a study of international economies, as well as developing economies. Participants will investigate the ethical dimensions involved in applying economic policies and practices, and attention will be paid to the development of possible solutions to the economic challenges that we face as an increasingly interdependent and global society."

IB Environmental Systems & Society SL

- Suggested Grade Level 11-12; 1 Credit
- "Through studying environmental systems and societies, students will be provided with a coherent perspective of interrelationships between environmental systems and societies; one that enables them to adopt an informed personal response to the wide range of pressing environmental issues that they will inevitable come to face The teaching approach is such that students are allowed to evaluate the scientific, ethical,

and socio-political aspects of issues. An Important aspect of the class is the hands-on laboratory work and field experiences. Topics include structure, measuring abiotic components of the system, measuring biotic components of the system, biomes, function, changes, and measuring changes in a system."

APPENDIX C: PASSING COURSE REQUIREMENTS



APPENDIX D: SAMPLE PEER EVALUATION SHEET FOR UN GOAL FINAL

PRESENTATIONS

Name:

1. UN Goal(s): ______ Who in the community did they meet with?

Who did they talk about?

What is one way you can implement this goal into your own life?

2. UN Goal(s):

Who in the community did they meet with?

Who did they talk about?

What is one way you can implement this goal into your own life?

3. UN Goal(s): _

Who in the community did they meet with?

Who did they talk about?

What is one way you can implement this goal into your own life?

4. UN Goal(s): _

Who in the community did they meet with?

Who did they talk about?

What is one way you can implement this goal into your own life?

5. UN Goal(s):

Who in the community did they meet with?

Who did they talk about?

What is one way you can implement this goal into your own life?

6. UN Goal(s): _

Who in the community did they meet with?

Who did they talk about?

What is one way you can implement this goal into your own life?

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