Sustainability Literacy & Pro-Environmental Behavior

A comparison across domestic and international students at The Ohio State University

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OVERVIEW

- Research Rationale

- Methodology

- Results

- Discussion

RESEARCH RATIONALE

- Sustainability literacy encompasses learning how humans have immediate as well as long term impact on the economy and ecology of communities (Dawe, et.al. 2005)

- The Sustainability Tracking, Assessment & Rating Systems (STARS) Credit – recognizes institutions assessing sustainability literacy of their students; focus on knowledge of sustainability topic, not values or beliefs.

- 3 dimensions of sustainability – environmental, social, & economic

- Pro-environmental behavior refers to "behavior that harms the environment as little as possible, or even benefits the environment" (Steg & Vlek, 2009)

- Environmental problems rooted in human behavior; necessitates measuring pro-environmental behaviors, and subsequently understand how these behaviors can be promoted/encouraged

RESEARCH RATIONALE

- Comparing domestic and international students
  - International students are an important source of diversity in American colleges (Zhao, et. al. 2005)
  - Promoting and valuing diversity can help in achieving higher level of intellectual and personal development among students
  - OSU ranks among the top 10 nationally for international student enrollment – 5,665 international students, spring 2013 semester
  - Provides a unique opportunity to compare and understand sustainability literacy and pro-environmental behavior across domestic and international students

METHODOLOGY

- Data collected as part of the 2nd annual OSU sustainability survey; administered in April, 2013.

- Survey administered to a random sample of 10,000 undergraduate students enrolled at Columbus campus

- Response rate of 16.16%

METHODOLOGY

- Domestic & International students demographics
  - Total undergraduate students – 42,010
  - Total international undergraduate students – 3,151
  - % international undergraduate students – 7.5

- Survey sample dynamics
  - Domestic undergraduate respondents – 1,463
  - International undergraduate respondents – 118
  - % international undergraduate respondents – 7.5

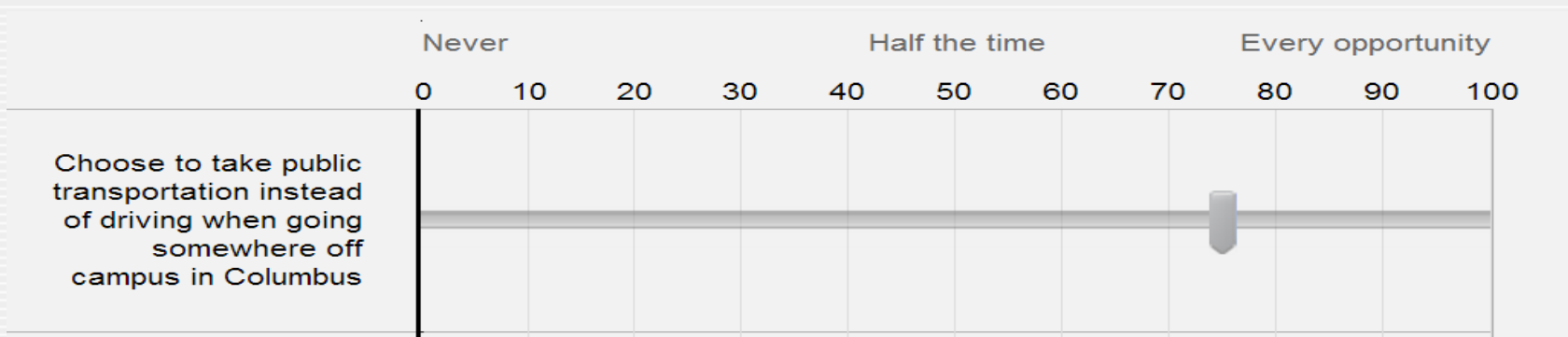- So, international students were well represented in the sample

METHODOLOGY

- For measuring Sustainability Literacy (SL)
  - A set of 21 single answer questions administered
  - Questions distributed across 3 domains; 9 environmental, 6 social & 6 economic
  - Skipping a question did not count as correct or incorrect
  - Respondents with >7 skipped questions deleted from the dataset; with ≤ 7 skipped questions retained
  - Mean percentage SL score calculated based on

    Number of correct response/Number of questions attempted
  - Following results obtained:
    - % Total SL score – Mean: 68.32, SD: 20.28
    - % Environmental SL score – 68.13, SD: 23.72
    - % Social SL score – 69.66, SD: 23.75
    - % Economic SL score – 67.23, SD: 24.14

METHODOLOGY

- ## For measuring pro-environmental behavior
  - ○ A total of 8 pro-environmental behaviors listed in the survey
  - ○ Respondents asked to indicate percentage of times they engaged in these behaviors whenever they had the opportunity to do so
  - ○ Response obtained using a slider bar; respondents moved the slider bar between 0 and 100%

|	Never				Half the time				Every opportunity	
	0	10	20	30	40	50	60	70	80	90	100

Choose to take public transportation instead of driving when going somewhere off campus in Columbus

RESULTS

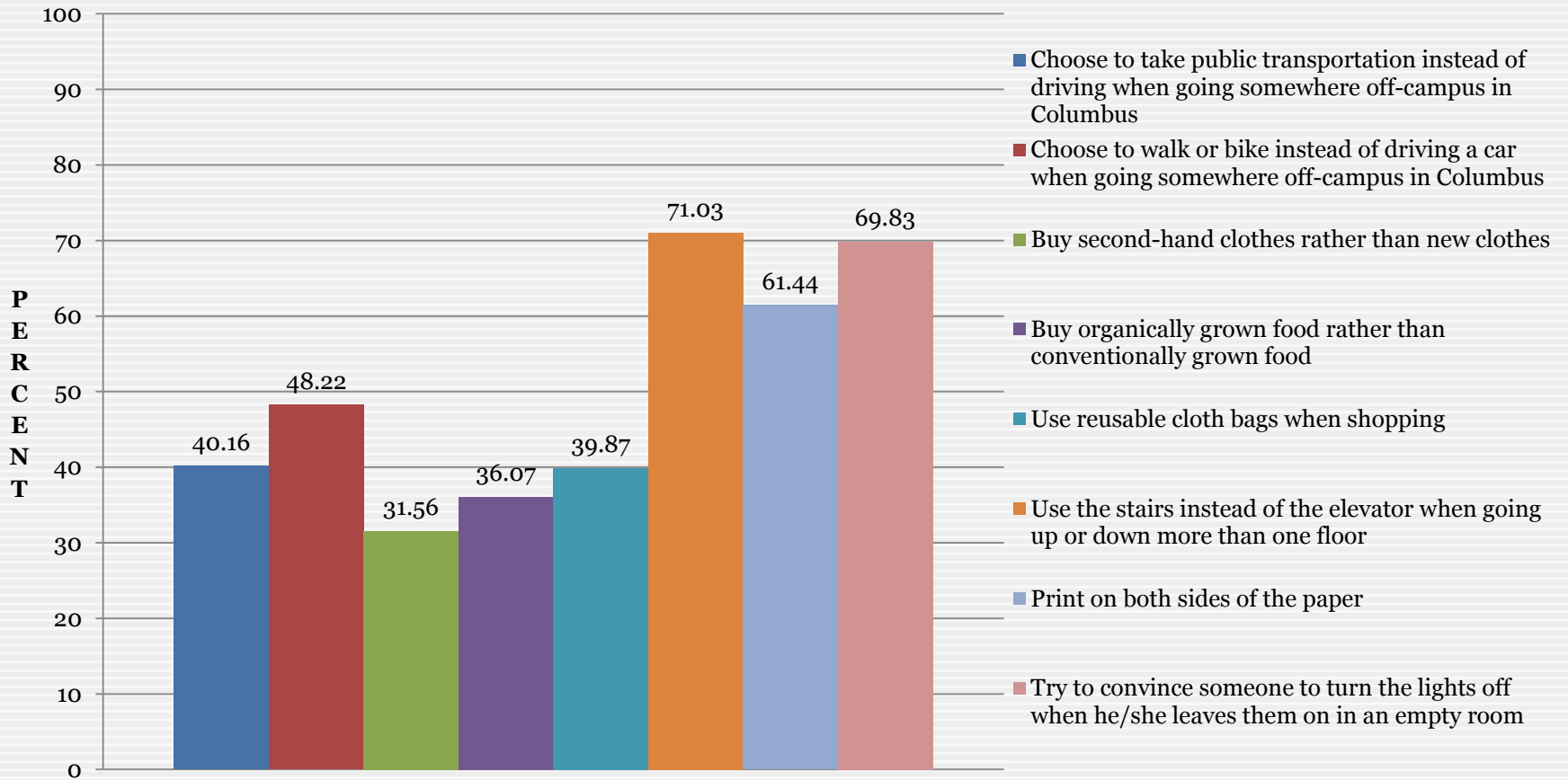| Sustainability Literacy	International Students	Domestic Students	Difference in mean scores
Total Sustainability Literacy	50.38	70.76	20.38* (-)
Environmental Sustainability Literacy	40.98	71.19	30.21* (-)
Social Sustainability Literacy	55.83	71.92	16.09* (-)
Economic Sustainability Literacy	58.95	68.96	10.01* (-)

RESULTS

Sustainability Literacy - Comparison across domestic and international students
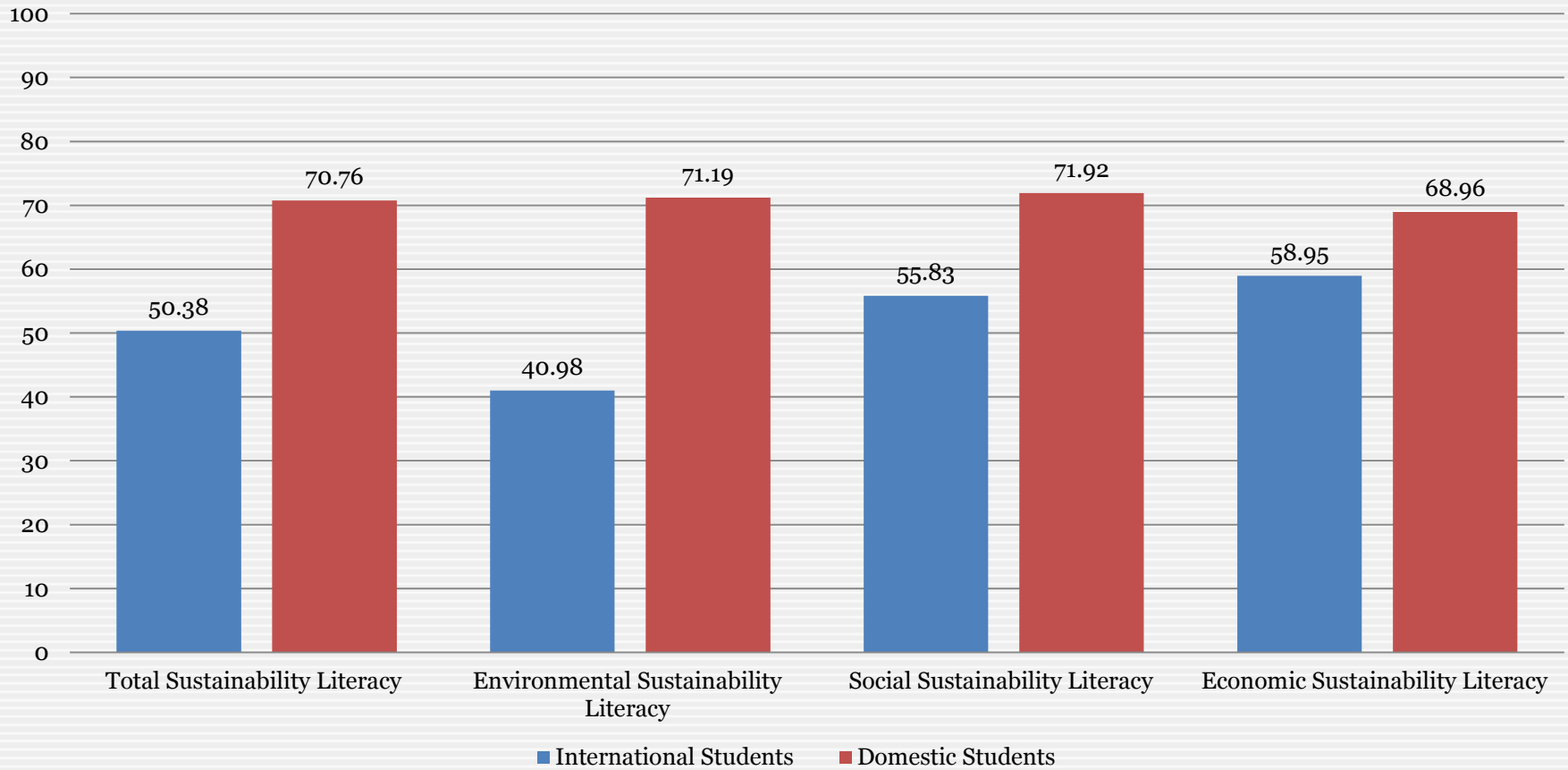
RESULTS

Percentage engagement in pro-environmental behavior, all survey respondents

- Choose to take public transportation instead of driving when going somewhere off-campus in Columbus
- Choose to walk or bike instead of driving a car when going somewhere off-campus in Columbus
- Buy second-hand clothes rather than new clothes
- Buy organically grown food rather than conventionally grown food
- Use reusable cloth bags when shopping
- Use the stairs instead of the elevator when going up or down more than one floor
- Print on both sides of the paper
- Try to convince someone to turn the lights off when he/she leaves them on in an empty room

Values: 40.16, 48.22, 31.56, 36.07, 39.87, 71.03, 61.44, 69.83

RESULTS

Pro-Environmental Behavior	International Students	Domestic Students	Difference in mean scores
Take public transportation instead of driving	59.52	38.50	21.02* (+)
Choose to walk or bike instead of driving a car	56.75	47.78	8.97* (+)
Buy second-hand clothes rather than new clothes	23.77	32.18	8.41* (–)
Buy organically grown food rather than conventionally grown food	48.06	35.15	12.91* (+)
Use reusable cloth bags when shopping	44.71	39.43	5.28 (+)
Use the stairs instead of the elevator	56.69	72.40	15.71* (–)
Print on both sides of the paper	63.25	61.51	1.74 (+)
Try to convince someone to turn the lights off in an empty room	68.67	69.94	1.27 (–)

RESULTS

Percentage engagement in pro-environmental behavior – Comparison across domestic and international students
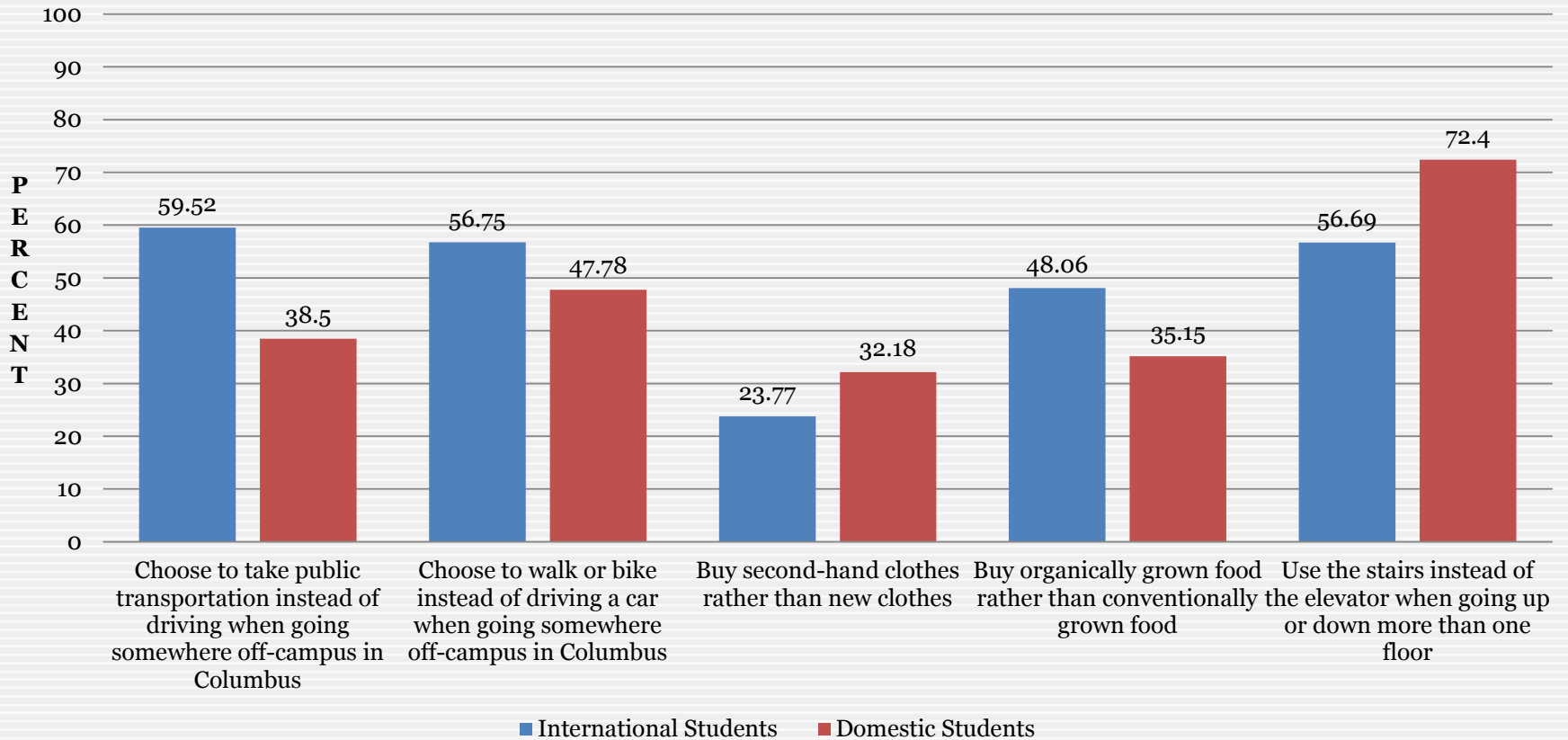
RESULTS

- Significant correlations between total sustainability literacy & pro-environmental behaviors for domestic students

Pro-Environmental Behavior	Correlation
Take public transportation instead of driving	$r = .06, p = .05$
Use the stairs instead of the elevator	$r = .12, p < .001$
Use reusable cloth bags when shopping	$r = .12, p < .001$
Choose to walk or bike instead of driving a car	$r = .08, p = .002$

RESULTS

- Significant correlations between environmental sustainability literacy & pro-environmental behaviors for domestic students

Pro-Environmental Behavior	Correlation
Buy second-hand clothes rather than new clothes	$r = .08$, $p = .008$
Buy organically grown food rather than conventionally grown food	$r = .07$, $p = .02$
Use the stairs instead of the elevator	$r = .13$, $p < .001$
Use reusable cloth bags when shopping	$r = .13$, $p < .001$
Choose to walk or bike instead of driving a car	$r = .07$, $p = .008$

RESULTS

- Significant correlations between total sustainability literacy & pro-environmental behaviors for international students

Pro-Environmental Behavior	Correlation
Buying second hand clothes rather than new clothes	$r = -.34$, $p = .001$
Print on both sides of the paper	$r = .24$, $p = .01$

- Significant correlations between environmental sustainability literacy & pro-environmental behaviors for international students

Pro-Environmental Behavior	Correlation
Buying second hand clothes rather than new clothes	$r = -.29$, $p = .006$
Print on both sides of the paper	$r = .19$, $p = .046$

RESULTS

- Summary of correlation results
  - For domestic students
    - 4 out of 8 pro-environmental behaviors significantly related to total sustainability literacy
    - 5 out of 8 pro-environmental behaviors significantly related to environmental sustainability literacy
    - Positive correlations, small effect size
  - For international students
    - 2 out of 8 pro-environmental behaviors significantly related to both total & environmental sustainability literacy
    - Both positive & negative correlations; medium effect size for the behavior with negative correlation

DISCUSSION

- Domestic students score significantly higher that international students on sustainability literacy assessment

- Significantly different level of engagement in pro-environmental behavior found for 5 out of 8 behaviors across domestic and international students

- 4 significant correlations between total sustainability literacy and pro-environmental behavior for domestic students; only 2 significant correlations for international students

- 5 significant correlations between environmental sustainability literacy and pro-environmental behavior for domestic students; only 2 significant correlations for international students

DISCUSSION

- Different mean knowledge scores between domestic and international students could suggest that international students are less knowledgeable about sustainability topics, in which case more effort could be made to teach international students about sustainability

- Different mean knowledge scores could suggest that survey instrument is geared towards the U.S. context, in which case administering the survey in other countries should include changing some questions to be more relevant in those countries

- Knowledge by itself is not a strong predictor of pro-environmental behavior, so it will take more than knowledge gain to foster behavior change; Link between knowledge and behavior is especially weak for international students

DISCUSSION

- In conclusion, we do find differences across domestic and international students, but what explains these differences?
- Due to sample size?
- Is it about how international students act, which is fundamentally different from domestic students?
- Possible next steps:
  - Interesting findings but scope for further exploration
  - Include more pro-environmental behaviors
  - Analysis using multivariate regression to estimate impacts of several variables while controlling for other variables
  - Suggestions?

REFERENCE

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APPENDIX

- 21 Question Sustainability Literacy Assessment

QUESTIONS - ENVIRONMENTAL

- What is the most common cause of pollution of streams and rivers?
- Ozone forms a protective layer in the earth's upper atmosphere. What does ozone protect us from?
- What is the name of the primary federal agency that oversees environmental regulation?
- What is the primary benefit of wetlands?
- Which of the following is an example of sustainable forest management?
- In the U.S., what do we currently do with the nuclear waste generated by nuclear power plants?
- The most significant driver in the loss of species and ecosystems around the world is?
- Of the following which would be considered living in the most environmentally sustainable way?
- Put the following list in order of the activities with the largest environmental impact to those with the smallest environmental impact.

QUESTIONS - SOCIAL

- Which of the following is the most commonly used definition of sustainable development?
- The wealthiest 20% of people in the U.S. own approximately what percent of the nation's privately held wealth?
- Over the past 3 decades, what has happened to the difference between the wealth of the richest and poorest Americans?
- Higher levels of education generally lead to…
- Which of the following populations has the highest rate of growth?
- Which of the following is the best example of environmental justice?

QUESTIONS - ECONOMIC

- Many economists argue that electricity prices in the U.S. are too low because...
- Which of the following countries has now passed the U.S. as the biggest emitter of the greenhouse gas carbon dioxide?
- Which of the following is a leading cause of the depletion of fish stocks in the Atlantic Ocean?
- Which of the following is the most commonly used definition of economic sustainability?
- Which of the following is the primary reason that gasoline prices have risen over the last several decades in the U.S.?
- The best way to support a local economy, such as the economy of Columbus, is to buy goods (groceries, clothing, toiletries, etc.) . . .