

## Does transmissive sustainability education encourage behavior change? A case study of a university course on food systems

**Julia Silver**, Latino Policy & Politics Institute, The University of California, Los Angeles,  
[juliasilver@luskin.ucla.edu](mailto:juliasilver@luskin.ucla.edu)

**Abstract:** Industrial forms of food production and consumption are tied to environmental and socio-economic crises like climate change and social injustice. Changes in consumer behavior provide a lever to initiate transformations toward a more sustainable food system. One vehicle that is widely recognized as having the ability to encourage behavior change at large is education. Sustainability education has become increasingly popular over the past two decades, often being studied in innovative teaching-learning formats which employ transformative pedagogies that aim to foster critical consciousness through deep listening, dialogue, action, and reflection of students. However, classical teaching formats that employ more transmissive pedagogies, focused on delivery and mastery of content, have been comparatively little researched in the field of sustainability with regard to how they impact student behavior. Thus, this research aims to study if transmissive sustainability education can encourage university students to consume food more sustainably. To accomplish this, a case study with 13 undergraduate students in a food sustainability course was conducted. Mixed-methods data collection and analysis techniques, such as questionnaires and interviews, were utilized in order to track participants' self-reported food consumption behaviors before, during, and after the course. Results suggest agreement among participants about the importance of course contents, but show no significant changes in their food consumption behaviors. The findings of this empirical study support the conclusion that imparting sustainability knowledge alone is insufficient to trigger behavior change.

**Keywords:** sustainability education; transmissive education; higher education; behavior change; sustainable consumption; food consumption

## 1. Introduction

There is an increasing need for sustainable food consumption in light of issues of environmental degradation and social injustice that are tied to traditional Western forms of food production and consumption (Vinnari & Tapio, 2012). Sustainability problems associated with food production and consumption are vast, including climate change, water scarcity, biodiversity loss, health issues such as cardiovascular diseases and diabetes, and unfair treatment of food production workers (Ericksen, 2008; Guyomard et al., 2012, Reisch et al., 2013). Globally, scientists claim that major changes to food systems are needed in order to meet climate goals, such as that of the Paris agreement that strives to limit worldwide temperature increase to 1.5° or 2.0° C (Clark et al., 2020). While unsustainable food production and consumption is a wicked problem and a variety of complex solutions to transforming the system have been suggested by researchers, scientists, and agriculturalists (Weber et al., 2020), this research focuses on one approach, which is the shift of individual food consumption behavior change towards more sustainable diets. A sustainable diet is one that “promotes health and well-being and provides food security for the present population while sustaining human and natural resources for future generations” (Dietary Guidelines Advisory Committee, 2015, n.p.). Targeting individual food consumption behavior change is vital in transforming food systems, as individual food consumers play a key role in shaping the systems at large due to purchasing power (Lusk & McCluskey, 2018).

Sustainability education is often viewed as a vehicle that can aid in the alleviation of sustainability crises (Arlinghaus & Johnston, 2017; Leicht et al., 2018). In this research, sustainability education is understood as an education that “aims at developing competencies that empower individuals to reflect on their own actions, taking into account their current and future social, cultural, economic and environmental impacts, from a local and a global perspective” (Rieckmann et al., 2017, p. 7). In higher education, many institutions call for education to take a transformational stance towards sustainability (Tilbury, 2011), which aims to foster critical consciousness through deep listening, dialogue, action, and reflection. Indeed, some studies provide first evidence that transformational sustainability education is associated with changes in behavioral inclinations and intentions among students (Movahed & Manuel-Navarrete, 2020; Wamsler, 2020; Frank & Stanszus, 2019). Despite this initial promising work, further research is needed to be able to reliably assess the extent to which forms of transformative sustainability education are able to bring about concrete changes in, for example, consumer behavior among students. While transformative sustainability education has the potential to impact behavior despite the still preliminary and emerging evidence base, surprisingly few studies examine the extent to which more transmissive forms of sustainability education, which primarily focus on the transfer of knowledge from teachers to students (Miller, 1996; Johnson, 2010; Sterling, 2001), a still widespread approach in higher education, are able to bring about behavioral changes in students. Thus, this study intends to explore if transmissive sustainability education is capable of triggering student behavior change towards more sustainable food consumption. It strives to do so by asking the following research question (RQ): To what extent does

transmissive sustainability education on food consumption encourage behavior change among university students?

## **2. Background**

### *2.1. Sustainability, food consumption, and education*

Food systems play a large, complicated role in global socio-economic health (Ericksen, 2008). Industrial food production fuels sustainability crises (Reisch et al., 2013). Additionally, sustainability crises like climate change fuel a decreased production of food globally due to an increase of issues like land degradation, water scarcity, and increasing variability and weather extremes (Nellemann et al., 2009; Springmann et al., 2016). Structural change of food systems is needed in order to create sustainable food systems (Foley et al., 2011; Eakin et al., 2017). While this structural change can be approached from a variety of angles, one suggestion by Weber et al. (2020) is to provide education to “support consumers in adopting sustainable consumption behavior” (p. 12). The role of individual food consumption behavior is vital in transforming food systems.

### *2.2. Sustainability education and behavior change*

There is much discourse in the field of sustainability about what the fundamental meaning of sustainability education is that also reflects controversies in the broader field of sustainability science. Miller (2013), for example, discusses varied approaches that explore that meaning, including the process-oriented and knowledge-first approaches. In each understanding, the role of scientists, research agenda, and approach to solving sustainability problems differs. The approach that most closely links sustainability and the facilitation of behavior change is the knowledge-first approach. In this approach, the encouragement of social change based on knowledge is prioritized. The intention of sustainability research under the knowledge-first understanding is to “link knowledge to action” (Matson, 2009, p. 41) and “drive learning and change processes” (Jäger, 2009, p. 3). This approach is traditionally associated with sustainability education as being transformational (Rodríguez Aboytes & Barth, 2020). Other educators emphasize the role of behavior change in education less, and adopt a more transmissive style of teaching (Miller, 1996; Johnson, 2010). The goal of education/teaching as transmission is for the teacher to pass on their knowledge to their students. This type of sustainability education is fairly common, as sustainability science as a field has a strong rooting in natural (or hard) sciences (Bettencourt & Kaur, 2011; Kates, 2011), which have been shown to favor a transmissive stance to teaching and learning (Neumann et al., 2002).

While sustainability education can be conceived as a continuum, balancing more change-oriented approaches with more content-oriented approaches, it is notable that many key sustainability scholars like Orr (1994) and Sterling (2001) have iterated that education can and should be a place of transformation of both individuals and society at large. Although this change-oriented approach is endorsed, much sustainability education in higher education is still content-oriented, or transmissive (Medrick, 2013; Wamsler, 2020). It has not gone beyond the objective study of

topics like “ecosystems, wider socioeconomic structures, technology and governance dynamics” (Wamsler, 2020, p. 113), and has thus ignored the study of personal transformation related to sustainability (Ives et al., 2019).

### *2.3. Knowledge and behavior connection*

Though there is no research that directly explores the behavioral impacts of transmissive sustainability education, the literature about the general concept, being the relationship between knowledge-exposure and behavior change, is vast, especially in research on pro-environmental behavior. Knowledge about a given environmental subject does not necessarily lead to changed behavior (Kollmuss & Agyeman, 2002; Schultz, 2002b). Behavior change related to the environment is person- and context-dependent, and empirical studies come to varied consensus about the role that knowledge has in ultimately causing change in behavior. Specified behavior change, like the adoption of recycling, has normally occurred in studies that have exposed participants to knowledge about recycling (Schultz, 2002b), whereas general pro-sustainability behavior change has not occurred in studies that exposed participants to information about climate change at large (Halady & Rao, 2010). In a systematic literature review of interventions that work to decrease meat consumption for food sustainability, Bianchi et al. (2018) found that interventions that solely provided information were likely to increase intention to change behavior, but unlikely to increase actual change. Additionally, they discovered that interventions that included personalized engagement, like through self-monitoring or lifestyle counseling, were more effective in changing food consumption behaviors towards sustainability. Further, in this research and at large, knowledge is not only transferred by course content, but by pedagogy. Pedagogy adopted by educators has a strong influence on student outcomes. Teachers who are more responsive, concerned, and engaging are preferred by students (Abrantes et al., 2007) and educators heavily influence students’ identities by sparking their development as societal members (Willemsen et al., 2005).

## **3. Methods**

### *3.1. Research design*

In order to answer the RQ, a case study with participants from an undergraduate food sustainability course at a large public university in the Southwestern United States was conducted. A case study approach was chosen, as there has not been research on this topic before, and an in-depth investigation was required (Feagin et al., 1991). Case studies are designed to utilize multiple sources of data both to fully represent the viewpoints of participants and to construct validity of findings (Tellis, 1997; Yin, 1994). This research does so while taking an exploratory approach, which aims to investigate some phenomenon in a holistic way, but also an explanatory approach, which seeks to explain that phenomenon to some extent (Yin, 1993). A mixed-methods approach was employed. This approach is utilized when researchers aim to answer their RQ(s) using both quantitative and qualitative techniques. It allows for the answering of explanatory and exploratory questions, can provide stronger inferences, and can offer more

perspective into the topic of study (Tashakkori et al., 2020). By using qualitative and quantitative approaches in tandem, the study is able to create more “comprehensive, insightful and logical results than either paradigm could obtain alone” (Greene & Caracelli, 1997, p. 10). The particular mixed-methods approach that I adopted is classified as being ‘embedded’, meaning that each form of data collection and analysis was embedded within one another, allowing for an emergent process that permitted the elaboration and expansion of each form of data to build a more in-depth understanding of the participants (Creswell & Clark, 2007; Creswell, 2003). This mixed-methods approach is appropriate with the research question, as it allows for the answering of *if* (using quantitative techniques) and *how* (using qualitative techniques) transmissive sustainability education encourages behavior change.

### 3.2. *Course description and participants*

#### 3.2.1. *Course description*

The course studied, which I will call SS 300, was offered at a large public research university in the Southwest United States. It was accessible to second- and third-year undergraduate students who studied Sustainability or Sustainable Food Systems. The class met on Zoom twice a week for one hour and 15 minutes for 15 weeks. Course content was about the foundations of sustainable food systems. Examples of topics covered in lectures include: smallholder farming, soil identification, land tenure change, ecosystem service loss, climate change, urban agriculture, etc. There were three class periods (out of 29) where food consumption behavior change was directly addressed - discussing meat production intensification, urban agriculture, and food security. The course measured success by tests, quizzes, essays, and analysis assignments. About 80% of class time was allotted to lectures by the instructor, and 20% for either discussion in the chat, or in breakout rooms. However, since it was not a requirement for students to keep their videos/audios on, sometimes the breakout groups would sit in silence until called back into the main lecture room.

#### 3.2.2. *Participants*

After building a relationship with the instructor and confirming the instructor’s willingness to allow me to conduct research on the class, I recruited participants by making an announcement about my research during the first class. I provided details about the study, and invited all of the students to sign a consent form and to complete the pre-course questionnaire. 13 of the 16 enrolled students did this. During the final class period, I made an announcement inviting these 13 students to complete the post-course questionnaire, which all of them did. Of the total sample, most were female ( $n=12$ ), a little over half were Sustainable Food Systems majors ( $n=7$ ), most were between 18-22 years old ( $n=9$ ), most were white ( $n=10$ ), while others were mixed-race ( $n=2$ ) or Asian ( $n=1$ ). Further, I invited the participants to sign up for 10-20-minute semi-structured interviews with me, so that I could better understand their pre- and post-course questionnaire responses. Five students did this, and I compensated them with gift cards. Of the five interviewees, most were female ( $n=4$ ), Sustainable Food Systems majors ( $n=3$ ), between

18-22 years old ( $n=3$ ), and white ( $n=3$ ), though others were mixed-race ( $n=2$ ). Participant names were changed for confidentiality purposes.

### 3.3. Data collection

This study utilizes varied forms of data collection: pre- and post-course questionnaires, field observations from every class period, weekly discussion board posts, and interviews. More details about the pre- and post-course questionnaires and interviews can be found below. The discussion board posts were all completed by participants with prompts from the instructor about various topics related to sustainable food production and consumption. The field observation notes consist of observations of interactions between participants and the instructor, and are only used to check the assumption that the course selected for the case study actually corresponds to a transmissive approach to sustainability education (“manipulation check”). Approximately 50 hours were spent gathering data. All data collection was completed online, due to the COVID-19 pandemic.

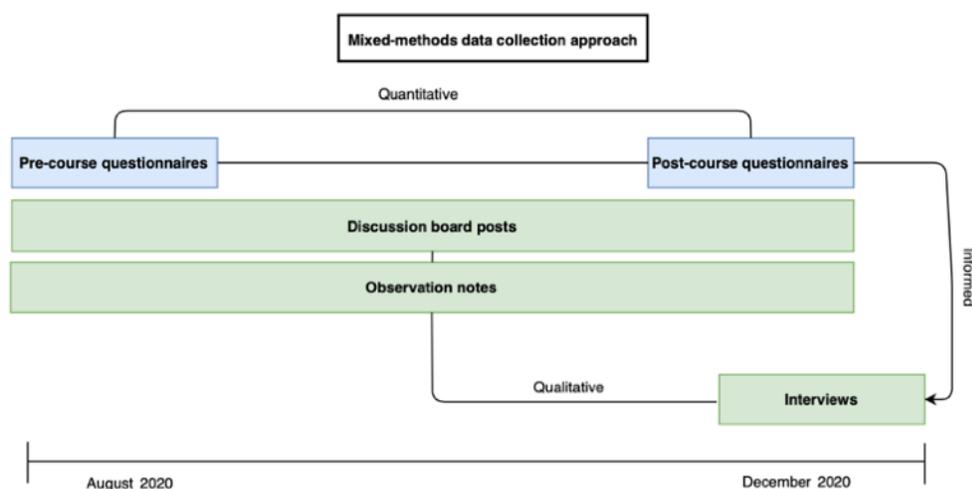


Figure 1: Mixed-methods data collection approach

#### 3.3.1. Questionnaires

The questionnaires were administered through the data software Qualtrics. They assessed each participants’: 1) general sustainability behaviors and inclinations, 2) food consumption behaviors, and 3) satisfaction with the course upon its completion. First, participants’ general sustainability behaviors and inclinations were measured because general affinity towards the environment and a just society have been shown to correlate with pro-sustainability behaviors (Kals et al., 1999; Schultz, 2002a; De Cremer & van den Bos, 2007). Thus, if a participant already has a stronger affinity towards sustainability, they theoretically are more likely to behave in sustainable ways. Additionally, having a baseline of participants’ general sustainability inclinations is useful to view in comparison with their food consumption behaviors. To measure

this, I adapted Alisat and Riemer's (2015) Environmental Action Scale (EAS). Since I addressed sustainability rather than just environmentalism, I slightly altered the wording of the scale to be more appropriate in that way. Second, participants' food consumption behaviors were assessed to answer the leading RQ. For the measurement of this dependent variable, I utilized Fischer, Böhme, and Geiger's (2017) Young Consumers' Sustainable Consumption Behavior (YCSCB) food scale. Third, course satisfaction was measured, as the course was one independent variable in this research, and feelings and inclinations about the course could influence participants' engagement with the material, instructor, and classmates, ultimately influencing their personal outcome from the course. Course satisfaction was measured using the highly popularized evaluation form from the University of Wisconsin, Madison (UWM) (2020). I shortened the form so that it only asked questions about the course's instructor, content, and format.

### *3.3.2. Interviews*

I attempted to recruit all of the participants to partake in interviews with me, but only five were willing/able. The interviews were semi-structured and covered topics like course satisfaction, influence of specific course modules, food consumption behavior at large, etc. The interview guide was designed in a way that allowed for space to discuss each interviewees' individual experiences and behavioral changes in the course as reported in their questionnaires.

### *3.4. Data analysis*

The pre- and post-course questionnaires were analyzed using statistical analysis within quantitative data analysis software SPSS. In the three quantitative datasets, results were controlled for major, sex, race, and age, although no relevant distortions were found. For the adapted EAS, paired t-tests were performed to determine statistical significance. For the YCSCB food scale, sign tests were performed to determine statistical significance as well as frequency of positive and negative result changes. For the UWM course evaluation, descriptive statistics, including mean, range, and standard deviation, were computed to determine overall satisfaction. Next, all forms of qualitative data were analyzed using qualitative data analysis software MAXQDA and Google Sheets. Thematic analysis (Braun & Clarke, 2012) was performed for all qualitative data. Commonalities and patterns within the data were assessed and grouped by theme.

## **4. Results**

### *4.1. Teaching and learning style*

Prior to beginning, the course studied in this research was identified by the syllabus, instructor, and former students through informational interviews to reflect key characteristics of a transmissive approach. I was able to confirm this through my observations in each class period. With that, during the first class, the instructor noted that one of the learning objectives for the class was to "develop a personal understanding of the structure of the food system and your own

place within a sustainable food system”. The instructor’s word choice to have students understand their places in sustainable food systems (instead of change their places) reflects the overall emphasis on topical understanding of content. Class sessions typically began by the instructor making a procedural comment (e.g. “Okay, it’s time to start now”, “I will start now”). The predominant teacher role observed, other than a lecturer, was that of a corrector. When students answered the instructor’s questions incorrectly, the instructor responded with procedural cues (e.g., "Okay, well, I'm not going to...") or with general comments about the typical knowledge level of the cohort (e.g., “Well, I know from previous experience that you guys are not good at geography”). Taken together, these observations confirmed the assumption that the course is a case example of a transmissive sustainability education approach/format.

#### 4.2. Quantitative data

	Statistical significance	Other findings
<b>EAS</b>	Pair 5 (Use of online tools [YouTube, Facebook, Wikipedia, MySpace Blogs] to raise awareness about sustainability issues) was statistically significant ( $p=0.032$ , $t=2.420$ ).	N/A.
<b>YCSCB</b>	No pairs were statistically significant.	Pair 15 (Use of frozen foods for meal preparations) had the most positive changes. Pair 18 (Use of fresh ingredients for meal preparations) had the most negative changes.
<b>UWM</b>	N/A.	Overall mean of all statements: 3.95. Lowest mean: 3.62 for statement 9 (This course was challenging). Highest mean: 4.54 for statement 8 (I believe that what I am being asked to learn in this course is important). Overall SD: 0.866. Lowest SD: 0.519 for statement 8. Highest SD: 1.109 for statement 1 (The instructor communicated clearly and was easy to understand).

Table 1: Synopsis of findings from pre- and post-course questionnaires  
SD = standard deviation

#### 4.3. Qualitative data

##### *Food consumption behavior changes & course relatedness*

Interview data point to a number of self-reported behavior changes, but also show that the participants did not attribute them to the course. In fact, when asked if the specific changes that each interviewee experienced were connected to the class, all five said that they were not. Each of the interviewees had direct explanations (unrelated to the course) as to what external circumstances prompted their behavior changes. For example, Courtney noted that the behavior

changes she experienced were due to a new roommate cooking often, her financial situation changing, and her personal goal to eat healthier to get in better physical shape. Yessenia mentioned that her behavior changes were due to her moving on campus and buying a meal plan.

#### 4.3.1. *Perceived role of personal food consumption behavior*

Even though there were three class sessions in which the instructor discussed food consumption behavior to some capacity, the participants only deliberated about this topic in one discussion board post – one with a focus on meat production and consumption. A few of the participants, who all reported to practice very sustainable food consumption in the pre-course questionnaire, wrote about the roles that individual food consumption behavior *and* the transformation of food production systems play in sustainable food systems at large. For example, Courtney stated that she thinks that “it is absolutely crucial that everyone in developed nations is aware of the land usage, water usage, and greenhouse gas emissions their diets are directly responsible for and try to make daily choices to lower these negative impacts”. Betsy wrote about her efforts in eating more sustainably, but also her struggles with the production side.

“One problem I have encountered as I personally attempt to lower my carbon footprint is how much deception people are subject to. So many companies claim to care about the environment, so it takes a bit of knowledge on the subject to truly know if they do”.

Betsy makes it her personal duty as a consumer to understand which food production systems are actually more sustainable than others (not just greenwashing), and make her decisions based on that personal research. Other participants, who did not have very sustainable food consumption practices before the class, avoided discussing personal consumption in their discussion posts that week. Instead, they considered how production methods need to change. For example, Jewel wrote that the key to cultivating sustainability is by adapting production by “working with nature, in conjunction with technology and the local ecosystem”.

#### 4.3.2. *Best practices for changing food consumption behavior*

Four of the interviewees practiced fairly sustainable food consumption behaviors before the class began. When asked what had encouraged them to do so, they said documentaries like ‘Kiss the Ground’ (Edwin), ‘What the Health’ (Luana), and ‘Dominion’ (Yessenia), influence from parents (e.g., “my parents definitely have always cared about that [environmental consciousness] and so I’ve been vegetarian since I was like 12 or 13”) (Courtney), involvement in personal research (Edwin), “a class that I took before this one about animal ethics and sustainability” (Yessenia), and books like ‘The Jungle’ (Luana).

In the absence of evidence that SS 300 provided sufficient incentives to change one's behavior, I asked the interviewees what they thought the best way to accomplish this was. They mentioned ideas like making education visual and experiential, gentle education, emotional appeal, and leading by example. Edwin noted, “when you just tell people facts it doesn't register maybe as thoroughly as it would if they saw it firsthand for themselves”, which is why he tries to teach

others through experience. Both Luana and Courtney mentioned that the best way to encourage someone to eat more sustainably is to educate them gently. By this notion of gentle education, they meant that teaching someone about something with the purpose of changing their behavior must be done in a way that is caring and kind, rather than aggressive or assertive. Luana, for example, said that when “you're in someone's face about a topic that you might be personally passionate about that is just intimidating to them and might push them away from that,” which ends up being unproductive and isolating. She suggested that one should teach others in a way that is compassionate and calm. Next, Yessenia stated that she prefers appealing to others’ emotions when trying to urge them to eat more sustainably, but also noted that everyone learns differently; she often has to educate others using factual information, and her own personal experience to give them a more holistic representation of what sustainable food consumption really is. Finally, Courtney and Jewel both discussed leading by example as a way to encourage others to eat more sustainably. Courtney said that she prefers to wait for others to ask her about her sustainable food consumption behaviors rather than telling others without being prompted.

#### 4.4. Findings at large

	<b>General sustainability affinity</b>	<b>Food consumption behavior</b>	<b>Course satisfaction</b>
<b>Key findings set 1</b>	Pair 5 (use of online tools to raise awareness about sustainability issues) was statistically significant ( $p=0.032$ , $t=2.420$ ).	There were no statistically significant behavior changes reported.	There was mixed course satisfaction about whether the instructor stimulated students’ interest in the subject matter, if the course made students think critically, etc.
	Interviewees made no correlation between this increase and their involvement in the course.	The insignificant changes that were experienced during the course were confirmed to be unrelated to the course.	There was mixed course satisfaction about the instructor’s teaching style, course impactfulness, etc.
<b>Key findings set 2</b>	There were a wide range of sustainability affinities and consumption behaviors reported by participants in the pre-course questionnaire.		There were mixed responses about whether the instructor communicated course information clearly and effectively.
	Those with stronger sustainability affinities and more sustainable consumption behaviors often placed weight of creating sustainable food systems first on themselves to be sustainable consumers then on producers to produce sustainably. Those with weaker sustainability affinities and less sustainable consumption behaviors often placed weight of sustainable food systems primarily on producers to produce more sustainably.		There were mixed responses about whether the instructor’s teaching style was conducive to student learning and if the instructor practiced clear communication of course contents.

Table 2: Findings compared by method

■ = Results by quantitative method; □ = Results by qualitative method

## 5. Discussion

### 5.1. *Sustainability affinity and behavior change*

Because this study did not evidence any food consumption changes at large (with the exception of pair 5 in the EAS, which was suggested to be unrelated to the course), the interviewees' mentioning of factors like documentaries, personal research, influence from parents, and other classes when asked what had encouraged them to change their sustainability-related behaviors before the course is key for exploring what content or interactions may actually trigger sustainable behavior change. Some of the factors mentioned have also been discussed in other studies. Previous research has shown that influence from peers can increase intention to purchase food more sustainably (Vermeir & Verbeke, 2006; Vermeir & Verbeke, 2008), exposure to documentaries can positively affect pro-environmental behavior (Janpol & Dilts, 2016), and family involvement in issues of sustainability can play a role in determining individual members' perceptions about and behaviors regarding sustainability (Barreto et al., 2014).

### 5.2. *Perception of transmissive education and behavior change*

As the mean for the UWM Course Evaluation was 3.95, the average participant was generally satisfied with the course (considering that each statement was positive and 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Even though the course did not change participants' food consumption behaviors significantly, or at all, students showed to be generally content with the course's instructor, curricula, and format. The lowest standard deviation (and thus highest agreement among the students) was found for pair 8 (SD=0.519), which is related to course content being important. Though this is the case, participants did not consistently agree that the execution of the course was either favorable or unfavorable. This is illuminated by the fact that pair 1 had the highest standard deviation (and thus disagreement; SD=1.109).

The inconsistency among participants regarding satisfaction with the instructor's transmissive delivery of the course in the UMW course evaluation was verified by interviewees. Data show that students had diverse experiences with the course and its curricula and pedagogy, but that most students believed the course content and knowledge to be important. Although most participants reported learning something subject-wise in this course, their behaviors were not changed. This is consistent with the larger environmental literature that claims that mere knowledge exposure does not necessarily correlate with changed behavior (Kollmuss & Agyeman, 2002; Schultz, 2002b). However, other case studies that have explored the role of transformative sustainability education and student development have found that courses can indeed be successful in fostering personal transformation (like changing behaviors) so far that they are not designed to only transmit knowledge, but to co-create shared experiential knowledge (Movahed & Manuel-Navarrete, 2020; Wamsler, 2020).

### 5.3. *Behavior change through sustainability education*

As there were no statistically significant values in the YCSCB scale, data suggest that students did not experience notable food consumption behavior changes at large. Though some non-significant behavioral differences (like in pair 15 and 18) were reported, interviewees all agreed that such changes were unrelated to the course. While I was not able to verify this with all participants, it is notable that all interviewees revealed that the specific behavior changes that they reported before and after the course were indeed unrelated to the course. Although only a subset of participants were interviewed, these results may be used as insight to the larger quantitative findings.

Consumers in previous research have been shown to be reluctant to change their own food consumption habits for sustainability purposes due to issues of tradition and general uncertainty (Vanhonacker et al., 2013; Font-i-Furnols & Guerrero, 2014). While such reasoning was not confirmed in this research, it is interesting to note that those participants who did not practice sustainable food consumption behavior before the course chose not to explore their personal relationship to sustainable food consumption in the discussion board, perhaps for reasons similar to those explored in the literature. Rather, these participants put the impetus of creating sustainable food systems solely on the side of production. While working to transform methods of food production and changing personal food consumption behaviors are both means to ultimately create a more sustainable food system (Weber et al., 2020), it is notable that these participants actively chose not to discuss their personal relationship to sustainable food consumption, even after being exposed to others' posts about their personal food consumption behavior, as well as course content about the subject.

The interviewees' mentioning of the factors that have or would have led them to change their food consumption behaviors being elements like making education visual and experiential, gentle and non-judgmental education, and emotional appeal is particularly interesting, considering that none of these factors were present in the course. The online format of the course should also be considered, since online education can be experienced as less visual and experiential overall than in-person education. Nonetheless, the course's lack of these behavior-changing elements further confirms that the transmissive structure and delivery of the course were not conducive for what the participants needed to foster their behavioral change.

#### *5.4. Research limitations*

This study has a number of limitations. First, the data in this study are self-reported. Transparency by participants was encouraged throughout the process, but nonetheless, data could possibly be unreliable due to the nature of self-reported data (Kormos & Gifford, 2014). Second, access to the participants was limited. Ideally, I would have been able to correspond with the participants after the course ended, especially to inquire about the particular findings of the pre- and post-course questionnaires. However, I was not granted this access due to my status as a student researcher. Third, the demographic representation of the sample is limited due to my lack of control of which students enrolled in the course. In research where the sample can be controlled, I strongly encourage representation of all groups. More marginalized individuals and

groups should be included in sustainability research, as Ohlson (2015) states, “the narrative of sustainability must be repositioned from a dominant, white, middle-class context to one that affirms, values and engages with the counter-narratives of marginalized identities” (p. 12) in order for sustainability education to be genuinely inclusive. Fourth, the sample size is limited due to low class enrollment during the pandemic. Though these limitations exist, I argue that this research still adds to the literature regarding sustainability education and consumption behavior in that it provides a single case study that illuminates the limited impact of transmissive sustainability education on student food consumption behavior change.

## **6. Conclusion**

This study aimed to explore the extent to which transmissive sustainability education on food consumption encourages behavior change among university students. It found that in this case, transmissive sustainability education did not have any significant impacts on participants’ food consumption behaviors. The limited shifts that did occur seem to be disconnected to the course. The mixed-methods approach that this study employed revealed that students perceived and engaged with the course in a variety of ways, but that at large, the transmissive foundation of the course was found to be non-conducive to triggering behavior change.

This research has implications for educators. It has shown that the transmissive education style that is commonly employed in higher education in general and in sustainability education in particular does not seem to promote behavior change among students. If sustainability educators desire for their students to change their behavior for more sustainable outcomes, but also intentionally design their courses to be transmissive, they should consider that that approach may not work to accomplish their desire.

Future research should continue to explore the relationship between transmissive sustainability education and behavior change in order to further understand the behavioral impacts that this type of education can have on students. Additionally, the ideas that participants of this study mentioned when asked what would encourage or has encouraged their behavior change (e.g. documentaries, books, visual education, emotional appeal, gentle education) could be examined further. Perhaps a sustainability course could be designed in a way that integrates such elements, and a study similar to this one could be performed. Further, a comparative study that explores behavioral effects of one transmissive sustainability education course and one transformative sustainability education course would also be insightful. In future research, a more diverse sample of students should be recruited so that this topic of study can be viewed more representatively and holistically.

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## Appendix A

**Please rank the following statements with the following options:**

**Never, once, a couple times, a few times, often.**

1. Educated myself about sustainability issues (e.g., through media, television, internet, blogs, etc.)
2. Participated in an educational event (e.g., workshop) related to sustainability.
3. Organized an educational event (e.g., workshop) related to sustainability issues.
4. Talked with others about sustainability issues (e.g., spouse, partner, parent(s), children, or friends).
5. Used online tools (e.g., YouTube, Facebook, Wikipedia, MySpace Blogs) to raise awareness about sustainability issues.
6. Used traditional methods (e.g., letters to the editor, articles) to raise awareness about sustainability issues.
7. Personally wrote to or called a politician/ government official about a sustainability issue.
8. Became involved with a sustainability group or political party (e.g., volunteer, summer job, etc.).
9. Financially supported a sustainability cause.
10. Took part in a protest/rally about a sustainability issue.
11. Organized a sustainability protest/rally.
12. Organized a boycott against a company engaging in unsustainable practices.
13. Organized a petition (including online petitions) for a sustainability cause.
14. Consciously made time to be able to work on sustainability issues (e.g., working part time to allow time for sustainability pursuits, working in a sustainability job, or choosing sustainability activities over other leisure activities).
15. Participated in a community event which focused on sustainability awareness.
16. Organized a community event which focused on sustainability awareness.
17. Participated in environmental or social conservation efforts (e.g., planting trees, restoration of waterways; community development).
18. Spent time working with a group/organization that deals with the connection of the environment to other societal issues such as justice or poverty.

**The following questions are about the topic of food. What generally applies to you?**

**Never, sometimes, often, always**

1. How often do you buy food for yourself?
2. How often do you prepare meals for yourself?
3. I eat red meat (beef, pork, lamb, etc.).
4. I eat chicken.
5. I eat fish.
6. I eat dairy products (butter, cheese, yogurt, etc.).
7. I keep a healthy diet.
8. I discard food products.

9. I buy snacks and beverages in disposable packaging (take away, fast food, coffee to go, etc.).
10. I buy organic food products.
11. I avoid food products in excessive packaging.
12. I buy fair trade food products (e.g., with a fair trade label).
13. I buy food products even just before the best before date expires.
14. I buy locally grown food products.
15. I use frozen foods for meal preparations.
16. I cook/prepare my meals energy-efficiently.
17. I reuse leftovers for the next meal.
18. I use fresh ingredients for meal preparations.

**I am now going to ask you some questions about your experience with the instructor, the course, and its contents. Please answer the following prompts**

**Strongly disagree, disagree, neutral, agree, strongly agree**

1. The instructor communicated clearly and was easy to understand.
2. The instructor encouraged student participation in class.
3. The instructor presented course material in a clear manner that facilitated understanding.
4. The instructor's teaching methods aided my learning.
5. The instructor stimulated my interest in the subject matter.
6. The instructor created a welcoming and inclusive learning environment.
7. The instructional materials (e.g., books, readings, handouts, study guides, lab manuals, multimedia, software) increased my knowledge and skills in the subject matter.
8. I believe that what I am being asked to learn in this course is important.
9. This course was challenging.
10. This course made me think.
11. I would recommend this instructor to others.
12. I would recommend this course to others.
13. This course had an impact on my individual learning and development

Author image



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