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UNDERGRADUATES

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SUSTAINABILITY KNOWLEDGE AND BEHAVIORS OF APPAREL AND TEXTILE UNDERGRADUATES

Abstract

Purpose: This study analyzed changes in undergraduate student knowledge of issues of sustainability relevant to the apparel and textiles industry. Assessment occurred prior to and upon completion of a course that addressed topics specific to the global production and distribution of apparel and textile goods. The study also examined modifications in students' reported apparel purchasing behaviors.

Design/Methodology/Approach: Participants included those in their third, fourth or fifth year of undergraduate education in the apparel and textile discipline at a higher education institution located in the Midwestern United States. All participants were enrolled in a course focused on globalization and the apparel and textile industry. Measures used to assess students' knowledge of social and environmental sustainability issues related to the industry and their apparel purchasing behavior were included in the research instrument.

Findings: Pre and post comparisons revealed significant changes in students' knowledge of social and environmental issues relevant to the apparel and textile industry. However, the study found no significant adjustments in apparel purchasing behavior. Further, a post-hoc analysis revealed no significant relationship between students' knowledge and their reported purchasing behavior.

Originality/Value: Limited resources exist which examine methods for educating apparel and textile students about sustainability issues, with even less research documented on assessing the effectiveness of these methods. This study analyzes the contributions sustainability-focused

curriculum can make in modifying the level of knowledge and purchasing behavior of students and recommends further strategies to yield possibly even greater results.

Keywords: Apparel purchasing behavior, Apparel sustainability, Sustainability knowledge

Category: Research Paper

SUSTAINABILITY KNOWLEDGE AND BEHAVIORS OF APPAREL AND TEXTILE

UNDERGRADUATES

1. Introduction

Since the UN declared 2005-2014 to be the Decade of Education for Sustainable

Development, educating students about sustainability has increased in importance. Higher

education's response encompasses a range of activities, including, but not limited to, campus

greening, student activism, and development of academic programs and courses.

One discipline that has responded is apparel and textiles (AT). According to Dickson *et al.* (2009), educating and involving students in promoting sustainability throughout the apparel

supply chain is warranted. Over the last decade, the AT industry has adopted a more globalized

business model and issues of sustainability have gained significance among all key players,

including firms and consumers (Kunz and Garner, 2011). Therefore, the preparation of students

as future advocates for a more sustainable AT industry mandated the infusion of sustainability

content into curricula and courses.

Issues of sustainability relevant to AT include those surrounding social responsibility and

the environmental impacts of producing and distributing soft goods. According to Dickson *et al.*

(2009), social concerns exist in "forced labor, low wages, excessive hours of work,

discrimination, health and safety hazards, psychological and physical abuse, lack of awareness of

workers' rights , and lack of worker representation for negotiations with management" (p. 6).

Environmental issues surround the use of energy and toxic chemicals in producing goods, as well

as the disposal of chemicals and other wastes (Dickson *et al.*).

Related to the progression of education for sustainable development (ESD) within the AT

discipline, O'Neal (2007) calls attention to the necessity of preparing students, for their future

careers, to identify and confront sustainability issues. Similarly, LeHew and Meyer (2005) describe

the need to foster AT students who are global citizens, understand the interdependence between the world and human beings, and have empathy for all living beings. Most recently, the International Textiles and Apparel Association published meta-goals for four-year baccalaureate AT programs that acknowledge the need for inclusion of sustainability in curricula (ITAA, 2008).

Sustainability-focused AT curricula concentrates on increasing students' knowledge of sustainability issues and engagement in sustainable consumer behaviors. Therefore, the purpose of this study was to examine the level of success a sustainability-focused AT curriculum has in influencing change among students—in terms of increasing knowledge of sustainability issues related to the AT industry and in impacting apparel-purchasing behaviors. The study measured AT related sustainability knowledge at two periods—prior to and after completing a course focusing on social and environmental issues pertinent to AT. Additionally, the study assessed engagement in sustainable apparel-purchasing behaviors. The implications of this study are noteworthy in advancing efforts aimed at encouraging greater and more effective integration of sustainability concepts into AT curricula.

2. Review of Literature

The Unsustainable Apparel and Textile Industry

In 2008, the global AT industry generated $1,025.9 billion in revenue (Datamonitor, 2009). Unfortunately, there are severe social and environmental externalities associated with this industry. From the necessary raw materials to the end-of-life impacts, the production and consumption of AT products damage the environment. Furthermore, the social consequences of apparel manufacturing include child labor, low wages, and unhealthy working conditions.

The AT supply chain carries a high environmental load in terms of energy use (Slater, 2003). For example, a t-shirt made from 100% cotton requires 109 mega joules of energy to grow and process the fibers, manufacture the yarns, knit the textile, construct the shirt, home

launder it 25 times, and incinerate it after disposal (Allwood *et al.,* 2006). AT production and consumption also require large water inputs. Dye processes can require eight separate dye baths before color saturation occurs, with each bath dictating additional volumes of fresh water (Hessel *et al.*, 2007); and some dye processes consume upwards of 132.5 liters of water per pound of textile (N.C. Division of Pollution Prevention and Environmental Assistance, 2009).

The industry's use of synthetic, often toxic, chemicals is also extensive. Cotton is one of the most chemically intensive crops, consuming 24% of the world's insecticides and 11% of pesticides (Lewis and Gertsakis, 2001). Manufactured fibers such as polyester and nylon are produced from petrochemicals and many of the chemicals used during dyeing, printing, and finishing of textiles are confirmed carcinogens and endocrine disruptors and are persistent in wastewater (Hessel *et al*., 2007; Ren, 2000).

Finally, AT production and consumption contributes to the earth's solid waste load. The AT industry in the United States, through both pre- and post-consumer waste, annually generates 12 billion tons of textile waste (EPA, 2006). Although the industry is efficient in capturing pre-consumer waste (recycling approximately 94% of the waste created), post-consumer recycling of AT products is significantly less. Annually, Americans throw away approximately 68 pounds of textiles per person (Council for Textile Recycling, 2003).

The AT industry has recently taken steps to decrease environmental impacts. For example, the industry has replaced some harmful chemicals with environmentally benign ones; implemented cold batch dyeing techniques that consume less water and energy; and designed closed-loop manufacturing that permit material recycling (Slater, 2003). Additional strategies include the use of eco-conscious textiles like organic cotton and hemp, designing apparel for recycling, and integrating concepts of slow design into product lines (Brown, 2010).

Beyond environmental issues, the AT industry is guilty of many social abuses, including instances of long hours, low wages, unsafe working conditions, child labor, emotionally or physically abusive supervisors, locked dormitories, and the exploitation of pregnant workers. According to Rivoli (2009), apparel factory owners and supervisors capitalize on the desperation and docility of workers. In many instances, apparel workers perform mind-numbing, repetitive tasks for 10 to 15 hours each day, six to seven days a week, for little pay. On average, apparel workers earn two-thirds of the hourly wage of workers in other manufacturing sectors, with the average hourly wage for apparel workers in developing countries ranging from $1.63 to $1.77 (Ross, 2004).

Education for Sustainability in Apparel and Textile Curricula

In reviewing both the environmental and social externalities of the AT industry, it is evident that, for the most part, the current industry is unsustainable. Fortunately, there are indications that the industry is making a commitment toward a more sustainable platform, creating a demand for professionals equipped with the sustainability knowledge, skills, and ethics needed to make positive contributions to an industry in transition. The infusion of sustainability into AT curricula is an essential component to this, equipping graduates with the occupational competencies required to navigate the industry and meet current and future sustainability needs.

AT faculty have adequate literature detailing the social and environmental impacts of the industry (Black, 2008; Blanchard, 2007; Dickson *et al.*, 2009; Fletcher, 2008; Hethorn and Ulasewicz, 2008). However, there is limited scholarship examining methods for educating AT students about these issues and even less research assessing student-learning outcomes. For example, Parker and Dickson (2009) compiled practical ideas and projects to aid educators in

teaching sustainability as it relates to the AT industry. However, while the publication contains

valuable resources and curriculum strategies, it lacks information related to assessing the

effectiveness of these approaches in increasing knowledge and modifying behavior.

Cao *et al.* (2006) developed a science-based course for AT students. Framed within the

cradle-to-cradle sustainable design paradigm (McDonough and Braungart, 2002), the purpose of

the course was to educate about the environmental issues related to AT production. Despite the

study detailing teaching strategies, similar to Parker and Dickson (2009), it did not include any

assessment of change in students' knowledge or behaviors.

Ulasewicz and Vouchilias (2008) identified perceptions of sustainable design among

interior design and AT students. This study concluded that, compared to the AT majors, the

interior design students had greater awareness of sustainability concepts and were more likely to

utilize principles of sustainable design. The authors also reflected that interior design curricula

has included sustainability concepts for a longer period compared to AT curricula and that there

is a need to integrate ESD more fully into AT courses.

Recent examples of frameworks for embedding sustainability in other disciplines are

numerous (Coral, 2009; Holmberg *et al*., 2006; Hopkinson *et al*., 2008; Hopkinson and James,

2010; Lidgren *et al*., 2006; Rusinko, 2010; Sammalisto and Lindhquist, 2008). Although these

studies contain constructive advice for AT faculty, the direct application of the research is

frequently limited due to divergent subject matter (e.g. engineering and mathematics).

AT baccalaureate programs typically provide specializations in design and/or marketing.

Therefore, logical external disciplines to consult when developing sustainability-focused AT

curricula are other design and business programs. From a landscape architecture design

perspective, Walker and Seymour (2008) utilized design charrettes to teach concepts of

sustainability. The authors assessed students' knowledge of sustainability issues pre- and post-charrette and concluded the design charrette effective as a sustainability teaching method. Similarly, Gulwadi (2009) detailed the use of journals with interior design students as a technique for persuading students to reflect on sustainable design principles. Gulwadi asserted that the writing was a valuable starting point for aiding students' processing of complex sustainability-related issues. However, the study did not include any formal assessment of student learning and neither Walker and Seymour or Gulwadi assessed change in student behavior that may have resulted from the teaching methods.

Business programs have also recognized the need to incorporate sustainability-related topics into curricula. Stubbs and Cocklin (2008) outline the guiding framework used for a sustainability unit available to business students at an Australian university. The authors discuss the content of the unit and learning activities and state that the goals of the unit is to increase appreciation of differing perspectives of sustainability, to debate corporate responses to sustainability issues, and to recognize the macroeconomic implications of sustainability. In another study, Benn and Dunphy (2009) report on another Australian university's process for incorporating sustainability throughout a business curriculum and highlight the value in utilizing case studies as a way for students to consider the complexity of sustainability issues. Once again, neither study provides any assessment on student learning or changes in related behaviors.

Despite the many positive advances related to infusing ESD into higher education, a lack of empirical studies assessing student learning and/or changes in behaviors remains; and this gap in knowledge is especially evident within AT. In recognition of this, the purpose of this study is to investigate the level of success a sustainability-focused curriculum has in influencing change among students in the AT discipline. Specific research questions addressed include:

(1)   How does sustainability-focused curriculum change students' knowledge of social

issues related to the AT industry?

(2)   How does sustainability-focused curriculum change students' knowledge of

environmental issues related to the AT industry?

(3)   How does sustainability-focused curriculum change students' apparel-purchasing

behaviors?

3. Method

Sample

The sample for this study included AT undergraduate students at a Midwestern United

States university with an estimated enrollment of 23,000 students. Specifically, the study utilized

students completing a course that provides an analysis of issues pertaining to the global

production and distribution of AT goods.

Students take the course during their junior or senior year. The course meets three times a

week and during the semester of data collection had an enrollment of 59 students, all of which

were AT majors. As part of the course, students are expected to comprehend factors affecting

compliance with laws and standards of social and environmental responsibility, as well as

recognize their own accountability—personally, professionally, and as a global citizen. Topics

covered within the course include an introduction to globalization and the criteria used by

apparel firms in making sourcing decisions. Students learn about the opportunities and

challenges in producing in developed versus developing nations and the role of politics in

governing AT trade regulation. The class also presents social and environmental issues

surrounding the production and distribution of AT goods, along with the role of ethics in

consumers' purchasing behaviors. Students complete assignments that require an understanding of corporate responsibility and ethics in fashion marketing and brand management.

Instrument

The instrument used in this study included scales measuring knowledge of issues of environmental and social sustainability in the AT industry and self-reported apparel-purchasing behaviors. Each measure included a five-point scale ranging from *1* (Strongly Disagree) to *5* (Strongly Agree). The instrument also utilized standard demographic measures including age, sex, year in school, and average monthly expenditures for new clothing.

Eight statements from the Knowledge of and Concern with Apparel Social Issues Scale (Dickson, 1999) were utilized to assess knowledge about the use of child labor and the treatment of workers in both domestic and foreign factories. Measurement of knowledge of environmental issues in the AT industry occurred by utilizing the Environmental Apparel Knowledge Scale (Kim and Damhorst, 1998). The scale included 11 statements pertaining to chemical pollutants produced in the manufacture and processing of fibers, the recycling and biodegradability of apparel goods, and regulations for clean air and water imposed on AT manufacturers.

The instrument also included the Sustainable Apparel-Purchasing Behavior Scale, developed by the authors, to assess actual apparel-purchasing behavior. Eight statements asked if the respondent had ever paid premium prices for goods produced in a sustainable manner, boycotted a company because of labor and/or environmental abuses, and researched a company's sustainability practices prior to purchase decisions. Previous studies have tested the scale (Hiller Connell and Kozar, 2009, 2010; Kozar and Hiller Connell, 2009), proving it to be a reliable measure.

Cronbach's standardized alpha evaluated the internal reliability of the scales (Krathwohl, 1998). All coefficient estimates for the measures were acceptable at the .60 level or higher. The alphas for the eight items of the Knowledge of and Concern with Apparel Social Issues Scale (Dickson, 1999), were .70 (first stage of data collection) and .82 (second stage of data collection). Among the items of the Environmental Apparel Knowledge Scale (Kim & Damhorst, 1998), the alphas were .62 and .68, accordingly. Finally, the alphas for the Sustainable Apparel-Purchasing Behavior Scale were .87 and .90.

Procedure

Students' responses on the instrument items were collected at two periods—both prior to and upon completion of the above described course. A 16-week time span existed between the two stages of data collection. To facilitate the documentation of individual changes in students' knowledge and behavior over time, a graduate assistant created a identification guide. Each student had an assigned identification number, with the questionnaires labeled and distributed accordingly. To protect the anonymity of students' responses, only the graduate assistant maintained access to the guide.

Data Analysis

Descriptive statistics were analyzed to provide a demographic overview of the sample. Additionally, in order to understand the characteristics of the sample, analysis of descriptive statistics on the individual items of each scale occurred. Data analysis also included calculating total scale scores for each of the scales and conducting paired sample t-tests to examine changes in students' knowledge and behavior. For each of the three measures, the mean scores were compared.

4. Findings

Overview of Sample

Four students were absent from class on the days of data collection, hence, 55 students participated in both stages of the study. The majority of participants (96%) were female students, which is representative of other AT undergraduate programs in the United States. Eighty five percent of participants were of traditional college age (20-23 years) with all participants reported to be in their third, fourth, or fifth year of college. The mean monthly average of students' reported expenditures on new apparel was $51 - $100. There was no significant difference in reported apparel expenditures at the two stages of data collection.

Knowledge of Apparel Sustainability Issues

As seen in Table 1, pre- versus post-mean scores increased on all items of the Knowledge of and Concern with Apparel Social Issues Scale (Dickson, 1999)—suggesting an increase in students' knowledge of social issues related to the AT industry. Additionally, as detailed in Table 2, the mean scores on the Environmental Apparel Knowledge Scale (Kim & Damhorst, 1998) were higher at the end of the semester on all but two items—indicating that students' knowledge of apparel environmental issues also increased.

The paired-samples *t*-test analysis of pre- and post-responses, outlined in Table 3, indicate a statistically significant increase in students' knowledge of both apparel related social and environmental issues. A comparison of the mean scores on the Knowledge of and Concern with Apparel Social Issues Scale (Dickson, 1999) showed that students were more knowledgeable on these issues at the completion of the course (*M*=4.01, *SD*=0.55) as compared to the start of the course (*M*=3.78, *SD*=0.54, *t*=-2.48, *p*=0.017). By the end of the course, students more strongly agreed that child labor is a practice among AT manufacturers and that AT manufacturers do not generally pay their employees at least the local minimum wage. Moreover,

Table 1

Participants' Knowledge of Social Issues

Issue*		Mean	Std. dev.	Frequency (%)				
				Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Use of child labor is a practice among…								
U.S. clothing manufacturers	Pre	3.18	1.072	1.96	35.29	13.73	41.18	7.84
	Post	3.34	1.255	1.89	39.62	1.89	35.85	20.75
Foreign clothing manufacturers	Pre	4.47	0.966	3.92	1.96	3.92	23.53	66.67
	Post	4.74	0.445	0.00	0.00	0.00	26.42	73.58
Clothing manufacturers do not pay their employees at least the local wage								
U.S. clothing manufacturers	Pre	2.82	1.034	5.88	43.14	15.69	33.33	1.96
	Post	3.26	1.195	1.88	37.74	9.44	33.96	16.98
Foreign clothing manufacturers	Pre	4.35	0.868	0.00	5.88	7.84	31.37	54.91
	Post	4.60	0.664	0.00	1.92	3.85	26.92	67.31
Clothing manufacturers have their employees work more than 40 hours per week								

Table 1 (continued).

Issue		Mean	Std. dev.	Frequency (%)				
				Strongly disagree	Disagree	Neutral	Agree	Strongly agree
U.S. clothing manufacturers	Pre	3.65	0.890	0.00	15.69	15.69	56.86	11.76
	Post	3.81	0.856	0.00	13.21	7.55	64.15	15.09
Foreign clothing manufacturers	Pre	4.35	1.055	3.92	3.92	7.84	21.57	62.75
	Post	4.70	0.575	0.00	1.89	0.00	24.53	73.58
Clothing manufacturers do not provide non-hazardous workplaces for their employees								
U.S. clothing manufacturers	Pre	3.06	0.904	1.96	27.45	37.25	29.41	3.93
	Post	3.25	1.036	0.00	33.96	16.98	39.62	9.44
Foreign clothing manufacturers	Pre	4.33	0.739	0.00	1.96	9.80	41.18	47.06
	Post	4.38	0.837	0.00	5.66	5.66	33.96	54.72

*Wording of these statements have been modified to reflect reverse coding of negative statements.

Table 2

Participants' Environmental Apparel Knowledge

Issue		Mean	Std. dev.	Frequency (%)				
				Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Chemical pollutants are produced during manufacturing of synthetic or manufactured fibers such as polyester	Pre	3.96	0.631	0.00	0.00	21.57	60.78	17.65
	Post	4.08	0.646	0.00	1.89	11.32	64.15	22.64
Chemical pollutants are produced during processing of natural fibers such as cotton*	Pre	3.33	0.993	3.92	15.69	33.33	37.25	9.80
	Post	3.68	0.996	1.89	15.09	13.21	52.83	16.98
Federally and regionally mandated standards for clean air and water have been imposed on textile companies*	Pre	3.20	0.872	1.96	15.69	50.98	23.53	7.84
	Post	3.04	0.919	5.66	20.75	39.62	32.08	1.89
Air pollution can occur during some common dye processes of textiles	Pre	3.96	0.564	0.00	0.00	17.65	68.63	13.73
	Post	4.15	0.601	0.00	1.89	5.66	67.92	24.53
Textile dyeing and finishing processes use a lot of water	Pre	4.02	0.547	0.00	0.00	13.73	70.59	15.68
	Post	4.32	0.613	0.00	0.00	7.55	52.83	39.62
Fibers such as wool can be commercially recycled*	Pre	3.53	0.857	1.96	3.92	47.06	33.33	13.73
	Post	3.60	0.947	1.89	5.66	43.40	28.30	20.75

Table 2 (continued).

Issue		Mean	Std. dev.	Frequencies (%)				
				Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Disposable diapers have substantially contributed to the quantity of textile products discarded in landfills	Pre	3.57	0.755	0.00	1.96	52.94	31.37	13.73
	Post	3.85	0.744	0.00	0.00	35.85	43.40	20.75
Special finishes on fabrics may create problems for recycling	Pre	3.82	0.767	1.96	1.96	21.57	60.78	13.73
	Post	4.23	0.609	0.00	0.00	9.43	58.49	32.08
Phosphate-containing laundry detergents can be a source of water pollution	Pre	3.61	0.666	0.00	0.00	49.02	41.18	9.80
	Post	3.87	0.761	0.00	1.89	30.19	47.17	20.75
Natural fibers are usually biodegradable	Pre	3.67	0.683	0.00	3.92	33.33	54.91	7.84
	Post	3.66	0.706	0.00	7.55	24.53	62.26	5.66
The use of larger quantities of natural fibers by the apparel industry will not significantly decrease energy consumption*	Pre	2.66	0.798	4.00	40.00	44.00	10.00	2.00
	Post	2.81	0.864	1.92	40.38	34.62	21.15	1.93

*Wording of these statements have been modified to reflect reverse coding of negative statements.

at stage two, students more strongly agreed that AT manufacturers generally expect employees to work more than 40 hours a week and do not provide safe workplaces.

Table 3

Pre- and Post-Test Data Analysis

Item	Pre-test mean	Post-test mean	Mean difference	Standard deviation	*t*	*p*
Socially responsible knowledge	3.7812	4.0052	-0.22396	.62631	-2.477	0.017
Environmental knowledge	3.5435	3.7311	-0.18762	.31286	-4.111	0.000
Apparel-purchasing behaviors	2.6378	2.6964	-0.05867	.59953	-0.685	0.497

In comparing the mean scores on the Environmental Apparel Knowledge Scale (Kim & Damhorst, 1998), see Table 3, a higher mean total score was found at phase two of data collection (*M*=3.73, *SD*=2.35 versus *M*=3.54, *SD*=1.33, *t*=-4.11, *p*=0.000). Upon completion of the course, students strongly agreed that the manufacturing of fibers produces pollutants, that air pollution can occur in the dyeing of textile goods, and that both dyeing and finishing processes use an abundance of water and create problems for recycling. Additionally, students gained knowledge on sources of water pollution, the biodegradability of fibers, and levels of energy consumption in using natural versus manufactured fibers.

Sustainable Apparel-Purchasing Behavior

While increases in students' knowledge of sustainability-related issues were evident, there was not a significant modification in sustainable apparel-purchasing behavior. As evidenced in Table 4, at both stages of data collection, students did not exhibit a willingness to

pay premium prices for goods produced in a sustainable manner. Likewise, students did not

indicate that a firm's record on the treatment of workers or their environmental practices in the

production of goods influenced their apparel purchasing decisions. Students did not report

actively inquiring about a firm's practices prior to making purchasing decisions nor did they

report previously boycotting a firm because of poor sustainability practices. Although pre- versus

post-mean scores slightly increased on a majority of the variables of the Sustainable Apparel-

Purchasing Behavior Scale and a higher mean score was found at phase two of data collection

(M=2.70, SD=0.69 versus M=2.64, SD=0.67), results of the paired-samples t-test revealed these

changes to be insignificant (t=-0.69, p=0.497).

5. Discussion and Conclusions

This study set out to examine the success a sustainability-focused AT curriculum had in

increasing knowledge. A main lesson of this study was that the integration of sustainability

issues into undergraduate courses can successfully increase student knowledge about AT-related

social and environmental issues. Through the incorporation of ESD into AT courses, educators

can develop students' abilities to identify, evaluate, and analyze AT related sustainability

issues—occupational competencies they need as professionals within the industry.

In the future, as the sustainability movement gains momentum within the AT industry, it

is critical that curricula stay up to date with industry trends and provides content and facts

responsive to current apparel social and environmental issues. Armed with this knowledge,

future professionals will be better prepared to contribute to the advancement of sustainability

within the supply chain.

A second objective of the study was to determine if knowledge positively influenced

behavior. The conclusion is that, even though knowledge may increase, there may not be a

Table 4

Participants' Apparel-Purchasing Behaviors

						Frequency (%)			
Issue		Mean	Std. dev.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
In the past, I have boycotted an apparel brand or retailer because of reports that the company…								
Goods were produced in an sweatshop	Pre	2.41	1.004	13.73	54.90	7.84	23.53	0
	Post	2.77	1.103	5.66	52.83	3.77	33.96	3.78
Had a poor environmental practices	Pre	2.51	0.946	9.80	50.98	17.65	21.57	0
	Post	2.55	0.932	5.66	56.60	16.98	18.87	1.89
In the past, I have paid more for clothes and accessories that I knew were made…								
Under fair labor standards	Pre	2.84	0.946	1.96	43.14	27.45	23.53	3.92
	Post	2.91	1.005	3.77	41.51	16.98	35.85	1.89
In an environmentally conscious manner	Pre	3.18	0.953	1.96	29.41	19.61	47.06	1.96
	Post	3.21	1.063	3.77	32.08	7.55	52.83	3.77

In the past, before making a purchase, I
have actively sought out or inquired about…

Table 4 (continued).

Issue		Mean	Std. dev.	Frequencies (%)				
				Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The conditions in which a company's clothes or accessories were manufactured	Pre	2.27	0.723	5.88	70.59	13.73	9.80	0.00
	Post	2.53	0.992	7.55	58.49	9.43	22.64	1.89
A company's environmental policies or practices	Pre	2.31	0.761	5.88	68.63	13.73	11.76	0.00
	Post	2.38	0.925	7.55	67.92	5.66	16.98	1.89
In the past a company's record on the treatment of workers in the production of their clothing or accessories influenced my purchase decision.	Pre	2.78	0.945	1.96	50.98	13.73	33.33	0.00
	Post	2.81	1.020	5.66	43.40	16.98	32.07	1.89
In the past, a company's record on environmental practices and policies in the production of their clothing or accessories influenced my purchase decisions.	Pre	2.86	0.960	1.96	47.06	13.73	37.25	0.00
	Post	2.83	1.105	7.55	43.40	11.32	33.96	3.77

significant change in sustainable apparel-purchasing behavior. In fact, a post-hoc analysis revealed that even students with high knowledge of these issues did not report more engagement in sustainable apparel purchasing. This may be attributable to the complexity of sustainable apparel purchasing, with many personal and contextual barriers limiting engagement in the behavior. Hiller Connell (2010) identified knowledge about sustainable apparel purchasing and attitudes towards sustainable apparel as two personal barriers. Although knowledge was not a barrier in this study, it is possible participants were unwilling to purchase sustainable apparel because they believed it unstylish, uncomfortable, or held other negative attitudes. Hiller Connell also identified contextual barriers to sustainable apparel purchasing that may be relevant to this study including limited product availability and financial resources for purchasing sustainable apparel. As further noted in the call for future research, additional methods for promoting sustainable apparel-purchasing behavior need exploration.

Given these possible barriers, the authors recommend that AT curricula should include information on the range of affordable possibilities for sustainable apparel consumption, including purchasing second-hand goods, limiting total consumption, and purchasing quality, classically-inspired apparel that can be worn indefinitely. Curricula should also guide students in translating sustainable apparel-purchasing intentions into action by: (1) changing the public context for sustainable apparel consumption (eliminating barriers to sustainable apparel consumption); and (2) helping students develop personal management and implementation plans, which include educating students on specific behavior change strategies and specifying where, when and how they will act (Arbuthnott, 2008). Furthermore, in order to develop future professionals committed to promoting a more sustainable industry, curricula should inspire the creation and marketing of stylish, affordable sustainable AT products.

Limitations and Call for Further Research

The findings of this study are limited in that the sample mostly included female students attending one institution. A broader sample will further assess the changes in students' knowledge and purchasing behaviors. Additional research should continue to examine these variables, utilizing samples representing males and females, as well as diverse disciplines and institutions.

At both stages of data collection, the Cronbach's alpha produced for the Environmental Apparel Knowledge scale (Kim and Damhorst, 1998) was on the lower end of acceptability. Therefore, future research should explore assessment of environmental knowledge and potentially the development of a more reliable measurement.

Also needed is additional research on methods for encouraging greater sustainable apparel-purchasing behavior. For example, peer pressure may motivate students to act more sustainably and the power of social norms in modifying apparel-purchasing behaviors needs exploration. In a study that involved using placards to encourage the reuse towels in hotel bathrooms, Goldstein *et al.* (2008) discovered guests were 25% more likely to reuse towels in rooms where the placard read, "Join your Fellow Guests in Helping to Save the Environment," as compared to guests whose placard stated, "Help Save the Environment, Show your Respect for Nature by Reusing Towels." Additionally, a third placard that testified, "Nearly 75% of guests who stayed in Room 331 reused their towels," yielded even higher compliance.

Another study found that the leveraging of social pressure decreased energy consumption among homeowners. Door hangers distributed to households urged homeowners to conserve energy, with each doorhanger promoting one of four different energy saving behaviors: limiting length of showers, turning off lights, turning down the air conditioning at night, and using fans

instead of air conditioning. In this regard, some homeowners were told they could save energy by switching to a fan while a second group was told they could prevent the release of greenhouse gases. A third and fourth group also existed, with the third set of homeowners told that it was the socially responsible thing to do and the fourth group told that 77% of their neighbors already use fans instead of air conditioning. The fourth group reduced their energy consumption by 10% while none of the other groups reduced their energy consumption by more than 3% (Nolan *et al.*, 2008). Therefore, further research should explore the efficacy of similar strategies for the encouragement of sustainable apparel-purchasing behaviors.

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