Extension Education Methods

Interpretation of Sustainable Landscapes Affects Student Perception of Sustainable Landscape Features

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Summary. This research examines student perception of sustainable landscaping at the University of Delaware (UD), Newark and the impact of interpretation on student perception of the landscape. Students living on UD's Laird Campus were surveyed before and after an interpretive campaign designed to describe the benefits of sustainable landscaping. The results of this study found that the majority of students surveyed perceive the landscape to be attractive, sustainable, well maintained, and functional, providing encouragement for the use of sustainable landscaping practices on university campuses. Reduced mowing (once per year), as it is implemented on Laird Campus, was identified as the sustainable practice least likely to be considered acceptable by students. Sustainable landscaping interpretation improved student awareness and acceptance of sustainable landscaping practices. Greater levels of engagement with the interpretation campaign increased students' awareness and acceptance of sustainable landscaping. In contrast to students' increased awareness and acceptance of sustainable landscaping practices, students' perception of the landscape's appearance did not significantly improve after the interpretation campaign, suggesting the need for future interpretation campaigns to directly address aesthetic issues in addition to interpretation of environmental benefits.

Sustainable landscapes include design, construction, operations, and maintenance practices that meet the needs of the present without compromising the ability of future generations to meet their own needs (Sustainable Sites Initiative, 2009). Practices associated with sustainable landscapes include but are not limited to reduction of lawn space and replacement with site climax vegetation such as meadows or forests; storm water management on site through bioswales and rain gardens; planting a high percentage of native plants to support native wildlife; and recycling materials within the landscape. In the past, ornamental horticulture has focused primarily on control and manipulation of the landscape with little regard for the existing or surrounding ecosystem. Practices such as routine mowing, chemical insect control, and selection of vigorous exotic plant species were employed to create uniform landscapes that placed primary value on aesthetics and standardized maintenance. These controlled landscapes meet the desired aesthetic function desired by most land owners, but do not provide the ecosystem services required to support life in an increasingly suburbanized world. Sustainable landscapes are increasingly recognized for their potential to enhance ecological, social, and educational benefits in urban and suburban landscapes (Ecological Landscaping Association, 2009; Miller and Hobbs, 2002; Rudd et al., 2002; Sustainable Sites Initiative, 2009; Tallamy, 2007). In the context of the rapid urbanization occurring today, urban green spaces, such as parks and public and private gardens will play a significant role in minimizing extinction of species and loss of human interaction with nature (Goddard et al., 2010; Miller, 2005).

Despite the recognized benefits of sustainable landscaping, there are still challenges in gaining widespread adoption of these practices. A sustainable landscape is meant to maximize environmental benefits without compromising the landscape's beauty and ease of maintenance (Bousselot et al., 2010). However, challenges to promoting sustainable landscape designs include overcoming aesthetic perceptions and increasing awareness of the benefits. Sustainable landscapes are often considered "naturalistic," "wild," or "unkempt." Incorporating sustainable landscaping practices with familiar garden design has been suggested as a way to help change control-oriented landscaping conventions (Beck et al., 2002; Nassauer, 1995; Özgüner and Kendle, 2006). Awareness of the importance of healthy landscaping practices also must be increased to foster

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Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
0.4047	acre(s)	ha	2.4711
0.3048	ft	m	3.2808
2.54	inch(es)	cm	0.3937

widespread adoption of sustainable landscaping. Gardeners often have the knowledge, motivation, and skills to practice environmentally sustainable gardening, but education is needed to increase awareness of the benefits afforded by sustainable landscaping as compared with control-oriented gardening practices (Clayton, 2007).

Greater adoption of sustainable landscapes requires public acceptance of sustainable landscaping paradigms and practices. To cultivate public acceptance of sustainable landscaping, people need to see the benefits of sustainable landscape management. Interpretation is a method of communicating information to voluntary audiences in ways that are fun and interesting (Ham, 1992). The goal of environmental interpretation is to provide opportunities for audiences to intellectually engage with an environment, thereby assisting in their understanding and appreciation of that environment. Allowing visitors to engage in environments and observe evidence facilitates the development of personally meaningful knowledge. Interpretation has been recognized as an important method for conveying the benefits of sustainable landscape development to the public (Sustainable Sites Initiative, 2009).

Universities have the ability to use their personnel and facilities to implement and communicate information about sustainable practices to others. The University of Delaware is committed to engaging the community in issues concerning sustainability, and UD recognizes that communication is an essential component in reaching their sustainability goals (UD, 2010). In addition, sustainable landscaping practices have been implemented over the past 2 years on UD's Laird Campus, especially surrounding a large residence hall, Independence Hall. Sustainable features on Laird Campus include reduced mowing of lawn areas (once per year), diverse native plantings, rain gardens, and a reforestation site.

However, in contrast to the UD's expressed interest in sustainability, there have been difficulties in obtaining widespread support within the UD community on the appearance and maintenance of sustainable landscape on Laird Campus. Negative comments from members of the university community resulted in the reduction of areas initially designated for reduced mowing. Little is known about the student response to the sustainable landscaping on Laird Campus. However, the negative opinions of some students and staff toward the sustainable landscaping (P. Glenn, personal communication; M. Loftus, personal communication), suggest there is still work to be done in the effort to communicate the benefits of sustainable landscaping at UD.

In this study, the following research questions were addressed: 1) What is the student perception of the appearance, maintenance, sustainability, and functionality of the sustainable landscape surrounding Independence Hall on Laird Campus? 2) Will the introduction of environmental interpretation on Laird Campus alter student perception of sustainable landscape management on Laird Campus?

Materials and methods

The sustainable landscape surrounding Independence Hall at the UD's Laird Campus served as the site for this research. Laird Campus, the northern section of the UD's Main Campus in Newark, is composed primarily of residence halls and a conference center. The campus is used on a daily basis by the 3196 UD students who live on Laird Campus, as well as, staff and visitors. The landscape is highly visible to vehicular traffic on Laird Campus and pedestrian traffic walking to and from Main Campus. The landscape is visible to conference visitors at Clayton Hall and guests of the Courtyard by Marriot Hotel, which are both just northwest of Independence Hall.

Four specific sustainable landscaping practices were evaluated in this study, including native plantings, reduced mowing/released turf, rain gardens, and reforestation. Survey questions asked students to consider two additional sustainable landscape features—increased wildlife habitat and meadow trails—not specifically demonstrated on Laird Campus. Native plants have been included in the ornamental plantings surrounding Independence Hall. A tall grass meadow comprised of a released area of turf and seeded switchgrass (*Panicum virgatum*) exists on the southwest slope adjacent to the dormitory. Three rain gardens that are ≈6 inches below grade are planted on the southwest slope. The reforestation site includes small seedling trees planted into unmown turf on the south side of the building.

Environmental interpretation materials were developed for this study to communicate the sustainable features of the landscaping surrounding Independence Hall. The interpretation materials developed for the site included five outdoor signs installed in the landscape, posters hung on dormitory walls inside Independence Hall, and an informational e-mail sent directly

Fig. 1. Introductory interpretive sign that describes the key sustainable features of the landscaping surrounding Independence Hall at the University of Delaware, Newark.

to the students. The interpretive materials identified and described the environmental benefits of key sustainable features on Laird Campus.

The five outdoor signs included an introduction sign (Fig. 1), a meadow sign, a rain garden sign, a native plant sign, and a reforestation sign. All signs were placed in locations that were both easily visible in the landscape and in close proximity to the sustainable feature described on the sign. The interpretive panels were 18 × 30 inches on 3-ft-tall posts and mounted at an angle for easy reading.

Interpretive posters were designed to highlight the same key sustainable features in the landscape. Five posters were developed, an introductory sign that highlighted all four key sustainable features of the landscape and four additional posters that corresponded to each key feature: meadows, rain gardens, native plants, and reforestation. Each poster had a relevant photo to identify the sustainable feature being described and a short phrase describing the benefits of the sustainable feature.

An informational e-mail was designed to provide additional information on the benefits of the sustainable practices on Laird Campus. The four highlighted sustainable features were identified and described using captivating phrases such as, "this rain garden is part of a healthy landscape," so, the information was interesting and memorable. The e-mail also referred readers to the existing UD Sustainability Site, where they could find further information on sustainable landscaping practices at UD.

SAMPLE POPULATION. The population for this study, students living in Independence Hall, was randomly assigned to a control group and treatment group. One group of students was assigned to the preinterpretation group (control) and the remaining students were assigned to the postinterpretation group (treatment). Respondents were invited to participate in the survey by e-mail and participation in the survey was voluntary. Respondents were offered the opportunity to enter a drawing for a $25 gift certificate to a local restaurant as an incentive for participation. The control group was surveyed before the interpretation campaign and the treatment group was surveyed after the interpretation campaign was complete.

SURVEY INSTRUMENT. An online survey (Table 1) was designed to assess student perceptions of the landscape. The survey was developed by the researcher after conducting qualitative interviews with four UD employees associated with the Laird Campus landscape project. These interviews identified key issues associated with sustainable landscaping and public perception, including general awareness of the landscape, sustainable components, and concerns about landscape attractiveness. The survey was administered to four professors and five graduate students in the UD College of Agriculture and Natural Resources to pilot test for clarity and ease of administration. The survey was designed to be administered on UD's Qualtrics Internet survey system.

The preinterpretation survey was launched to the preinterpretation control group on 16 Sept. 2010. Reminder e-mails were sent to the preinterpretation survey group on 20 and 28 Sept. 2010. The preinterpretation survey was closed and thank you e-mails were sent to participants on 4 Oct. 2010. Interpretive signage was installed in the landscape on 12 Oct. 2010. Interpretive posters were hung in Independence Hall in hallways and common areas on 20 Oct. 2010. The information e-mail was sent to all students living in Independence Hall on 3 Nov. 2010. The postinterpretation survey was launched to the postinterpretation treatment group on 11 Nov. 2010. Reminder e-mails were sent to the postinterpretation survey group on 16, 22, and 30 Nov. 2010. The postinterpretation survey was closed and thank you e-mails were sent to participants on 3 Dec. 2010.

Summary statistics of attitudinal variables were used to assess the overall perceptions of the surveyed population before the interpretation campaign on Laird Campus. Results from the pre- and postsurveys were analyzed using chi square tests to assess whether there were any changes in student perception after the interpretation campaign.

An interpretation engagement index was created to analyze the effect of increasing engagement with the interpretation campaign. Postinterpretation survey respondents indicated how they heard about the sustainable landscaping on Laird Campus from a list of possible interpretation materials [UD sustainability website (UD, 2010), signage in the landscape, posters in Independence Hall, e-mails on sustainable landscaping, courses at UD]. Respondents were assigned to an interpretation engagement level of none, low, or medium/high if they had engaged in zero, one, or more than one of the interpretation materials, respectively. Attitudinal variables from the postinterpretation surveys were compared with the interpretation engagement index using chi square analysis to analyze student perceptions, with increasing levels of engagement with the interpretation campaign.

All survey data were analyzed using JMP® statistical software (version 8; SAS Institute, Cary, NC). Percentages were calculated excluding missing data from nonresponses. To accurately analyze chi square results, variables that occurred fewer than five times in a contingency table cell were collapsed into the most closely related category.

Results and discussion

RESPONSE RATE AND DEMOGRAPHICS. Of the 297 students petitioned to take part in the preinterpretation survey, 110 respondents took the survey for a response rate of 37.0%. The gender distribution of the preinterpretation survey was 76.6% female and 23.4% male. The class distribution of the preinterpretation respondents was 72.0% sophomore, 20.6% junior, and 7.5% senior. The median age for the preinterpretation survey was 19 years, and the mean age was 19.4 years (SD = 0.7 year). All respondents ranged between the ages of 18 and 21 years.

Of the 297 students petitioned to take part in the postinterpretation survey, 107 respondents took the survey for a response rate of 36.0%. The gender distribution of the postinterpretation survey was 72.8% female and 27.2% male. The class distribution of the postinterpretation respondents was 60.2% sophomore, 27.2% junior, and 12.6% senior. The median age for the postinterpretation survey was 19 years, and the mean age was 19.7 years (SD = 0.9 year). All respondents ranged between the ages of 18 and 23 years.

Both survey groups were representative of the population with respect to age and class status based on

Table 1. Questions included in the student perception of the landscape survey conducted with student residents of Independence Hall, University of Delaware (UD), Newark. All questions were included in both the pre- and postinterpretation survey except for question 9, which was only included in the postinterpretation survey.

1. How often do you pay attention to the landscape surrounding Independence Hall? (all the time, some of the time, rarely, never, don't know)

2. How would you rate the appearance of the landscaping surrounding Independence Hall? (excellent, good, average, poor, don't know)

3. How would you rate the maintenance of the landscape surrounding Independence Hall? (excellent, good, average, poor, don't know)

4. How would you rate the environmental sustainability of the landscaping surrounding Independence Hall? (very sustainable, somewhat sustainable, somewhat unsustainable, very unsustainable, don't know)

5. How accurately do the following words describe the landscape surrounding Independence Hall: messy; low maintenance; safe; eco-friendly; attractive; functional; well maintained? (very accurate, somewhat accurate, not accurate, no opinion)

6. What is your opinion on incorporating the following landscaping practices surrounding Independence Hall: reduced mowing; rain gardens; reforestation; native plantings; increased wildlife habitat; meadow trails? (definitely acceptable, somewhat acceptable, not acceptable, no opinion)

7. How important is it to you that the landscaping around Independence Hall is managed in an environmentally sustainable manner? (very important, somewhat important, not very important, not at all important, no opinion)

8. Have you heard about environmentally sustainable landscaping efforts on Laird Campus? (yes, no)

9. If respondents answered yes to question 8: How did you hear about sustainable landscaping on Laird Campus? Please control all that apply. (UD sustainability website, signage in the landscape, posters in Independence Hall, e-mails on sustainable landscaping, courses at UD, word of mouth, other)

10. Do you have any suggestions or comments about the landscaping surrounding Independence Hall?

11. What is your gender?

12. What is your age?

13. What year of school are you in?

comparisons to characteristics of Independence Hall's student population obtained from the UD Housing Assignment Services. However, respondents were dissimilar from the population with respect to gender, with a greater proportion of females responding compared with the dorm population (76.6% females responded compared with a population value of 62.8%, $P = 0.0027$). Differences in gender between the sample and population for this study represent a potential bias in the results but are expected to be modest, since males and females did not significantly differ in their responses to many of the survey questions.

Student perception of the landscape preinterpretation. Before the interpretation campaign, the majority of students (86%) indicated they pay attention to the landscape at least sometimes, indicating that the population of this study is somewhat aware of their landscape. The majority of students (83%) consider sustainable landscaping at least somewhat important to them. This expressed importance of landscape sustainability is consistent with survey studies measuring worldwide public attitudes toward environmental concerns (Leiserowitz et al., 2006). This result also supports research that suggests younger, highly educated age groups are more inclined to prefer sustainably managed landscapes (Tyrväinen et al., 2003).

In regards to sustainability, the majority of respondents (93%) rated the landscape at least somewhat sustainable. In contrast, the majority of respondents (84%) indicated they were not aware of sustainable landscaping on Laird Campus. Despite high levels of attention to the landscape, students were not aware of the sustainable landscaping on Laird Campus, suggesting that students may not be aware of how landscaping features differ environmentally.

Most specific sustainable landscaping practices were considered acceptable by almost all students. Rain gardens, reforestation, native plantings, increased wildlife habitat, and meadow trails were all considered at least somewhat acceptable for Laird Campus by over 85% [over half (53.8% to 68.5%) considered the practices definitely acceptable]. However, reduced mowing was considered less acceptable with only 68.8% considering it to be at least somewhat acceptable (of those only 26.9% considered it to be definitely acceptable) (Table 2).

The majority of students (83%) rated the landscape's appearance as better than average. The majority (97%) also considered the landscape at least somewhat attractive, and the majority (83%) did not consider the landscape messy. In regards to landscape maintenance, the majority of respondents (75%) rated the landscape maintenance as better than average. The majority of students (62%) did not consider the landscape low maintenance. The majority of

Table 2. Summary of survey respondent's rating of the acceptability of incorporating sustainable landscaping practices on Laird Campus at the University of Delaware, Newark. Chi square test results for comparisons of pre- and postinterpretation survey attitudinal variables.

	Preinterpretation survey			Postinterpretation survey			Pre vs. post
Landscape practices	Definitely acceptable (%)	Somewhat acceptable (%)	Not acceptable (%)	Definitely acceptable (%)	Somewhat acceptable (%)	Not acceptable (%)	*P*
Rain gardens	54.2	41.0	4.8	69.6	26.1	4.3	0.037*
Reforestation	61.4	31.8	6.8	77.7	20.2	2.1	0.017*
Native plantings	68.5	28.3	3.3	74.2	22.6	3.2	0.390
Increased wildlife habitat	53.8	32.3	14.0	61.9	27.8	10.3	0.503
Meadow trails	65.6	27.1	7.3	75.8	19.2	5.0	0.298
Reduced mowing	26.9	41.9	31.2	40.9	43.2	15.9	0.029*

*Indicates significantly different response distributions at the 0.05 significance level.

students (96%) consider the landscape at least somewhat functional, and the majority of students (97%) consider the landscape at least somewhat safe.

THE IMPACT OF INTERPRETATION ON STUDENT PERCEPTION OF THE LANDSCAPE. Students responding after the interpretation campaign were less likely to pay attention to the landscape all the time (P = 0.032). However, no relationship was observed between student attention to the landscape and interpretation engagement, and the observed reduction in attention to the landscape may have been the result of an independent variable such as the progression of the school year or change in seasonality. The fact that respondents who rarely pay attention to the landscape were just as likely to engage in the interpretation materials as respondents who pay attention to the landscape all the time suggests that the interpretation materials developed for this study were effective in reaching a broad audience.

Survey respondents were significantly more likely to report they had heard of sustainable landscaping on Laird Campus after the interpretation campaign (P < 0.0001). Awareness of sustainable landscaping on Laird Campus increase was 15.9% in the preinterpretation group and 71.2% in the postinterpretation group (Fig. 2). The increase in awareness of sustainable landscaping was found to be a direct result of the interpretation campaign when compared with interpretation engagement. Of the postinterpretation respondents who did not engage in any interpretation materials, only 9.1% had heard of sustainable landscaping on Laird Campus. In comparison, of the respondents who engaged in one or more of the interpretation materials, all respondents (100%) indicated they had heard of sustainable landscaping on Laird Campus.

Respondents of the postinterpretation survey were asked to indicate how they heard about sustainable landscaping on Laird Campus. Seventy-four responses were received from which 71.6% indicated they heard about sustainable landscaping from the signage in the landscape, 48.6% from e-mails about sustainable landscaping, 37.8% from posters in Independence Hall, 18.9% by word of mouth, 5.4% from the UD sustainability website (UD, 2010), and 2.7% from classes at UD. This result shows that in this interpretive campaign, the signage in the landscape was the most effective way of reaching the audience. The informational e-mail was a particularly easy method of increasing awareness in students living near the landscape. Very few respondents indicated they had heard of sustainable landscaping from the UD Sustainability website. This surprisingly low result suggests that the website may not be effectively marketing UD's sustainable projects to the student population.

In regard to specific landscaping practices, postinterpretation respondents were more likely to consider sustainable landscaping acceptable on Laird Campus after the interpretation campaign. This result is consistent with other research that has shown that interpretive programs increase knowledge and shifts in attitudes (Madin and Fenton, 2004; Marynowski and Jacobson, 1999). Overall postinterpretation respondents indicated that rain gardens (P = 0.037), reforestation (P = 0.017), and reduced mowing (P = 0.029) were more acceptable as landscaping practices for Laird Campus than preinterpretation respondents (Table 2).

These results were directly associated with respondent engagement with the interpretation. In the case of reforestation (P < 0.001) and rain gardens (P = 0.075), respondent's

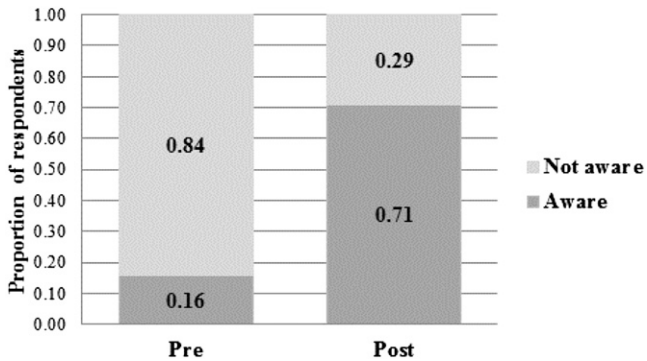

Fig. 2. Pre- and postinterpretation survey respondents' awareness of sustainable landscaping on Laird Campus at the University of Delaware, Newark [χ^2 (1, n = 211) = 65.67, P < 0.001].

Table 3. Postinterpretation respondents' acceptance of sustainable practices on Laird Campus at the University of Delaware, Newark as compared with their level of interpretation engagement (none, low-viewed one type of interpretation, and moderate/high-viewed two or three types of interpretation).

	Level of engagement						
	None		Low		Moderate/high		
Sustainable practice	Somewhat/not acceptable (%)	Definitely acceptable (%)	Somewhat/not acceptable (%)	Definitely acceptable (%)	Somewhat/not acceptable (%)	Definitely acceptable (%)	*P*
Reforestation	46	54	23	77	3	97	0.001*
Rain gardens	44	56	32	68	18	82	0.075**
Reduced mowing	79	21	44	56	59	41	0.100**

*Indicates significantly different response distributions at the 0.05 significance level.
**Indicates significantly different response distributions at the 0.1 significance level.

acceptance of the sustainable practice increased as interpretation engagement increased (Table 3). The more interpretation materials the students engaged with, the more likely they were to consider reforestation and rain gardens to be acceptable practices for Laird Campus.

In the case of reduced mowing, students who engaged with the interpretation campaign were more likely to consider reduced mowing acceptable on Laird Campus than students who did not engage with any interpretation ($P = 0.100$) (Table 3). However, students who engaged with moderate/high levels of interpretation were not any more likely to consider reduced mowing acceptable than students who only engaged with one interpretation material. In this case, increased engagement with the interpretation did result in more student acceptance, but it did not reach the same level as that of other landscaping practices. This result reflects the fact that reduced mowing is the most difficult of the sustainable landscaping practices on Laird Campus to be viewed with widespread acceptability, but that the interpretation did improve student perception.

In the case of reforestation, rain gardens, and native plantings, respondents' acceptance of these practices was directly related to increasing levels of interpretation engagement (Table 3). This result shows that engagement with the interpretation resulted in shifting attitudes toward landscape management practices and desired actions for the landscaping on Laird Campus. This result is consistent with previous research that found the impact of interpretation to be greater in individuals exposed to multiple levels of interpretative materials (Madin and Fenton, 2004; Weiler and Smith, 2009).

After the interpretation campaign, student acceptance of reforestation and reduced mowing both increased. However, reforestation was found to be definitely acceptable by a larger majority of students overall than reduced mowing (77.7% compared with 40.9%). It is interesting to note that the reforestation site on Laird Campus was very similar in appearance to the reduced mowing sites at the time of the survey. This is because the reforestation site contained tall grasses and the trees planted there were still small and inconspicuous among the grass. The fact that reforestation was found to be more acceptable by students than reduced mowing suggests that students might consider tall grass more acceptable if it is associated with the purpose of reforestation.

The majority of postinterpretation respondents rated the landscape's appearance to be above average. However, upon further examination of the appearance variables in relation to the interpretation engagement index, this study revealed that respondents who engaged with more interpretation materials were somewhat less likely to consider the landscape "attractive" ($P = 0.0654$) and more likely to consider the landscape "messy" ($P = 0.031$) (Table 4). The fact that the majority of the postinterpretation respondents still considered the landscape appearance better than average means this change in perception of the landscape's appearance is subtle, but does appear to be related to engagement with the interpretation developed for this study. This result may be related to the fact that postinterpretation respondents were significantly more likely to be aware of sustainable landscaping on Laird Campus. Past research has demonstrated that sustainable landscaping practices can be perceived as messy or less attractive than traditional landscaping practices (Parsons, 1995). Students who were aware of the sustainable landscape management may have been more likely to report the landscape as messy or unattractive based on this known perception. This result was also apparent in postinterpretation comments on the sustainability and appearance of the landscape. Some students recognized that the landscape was more sustainable, but still found the landscape to be unattractive commenting "it's great that the school is doing this but it looks really messy," or "I understand that we are trying to be more sustainable but it looks unkempt in some areas. I don't like that look. I like the more polished look of main campus." This conflicting relationship between sustainable landscaping practices and environmental aesthetics has been recognized by many researchers (Gobster, 1999; Özgüner

Table 4. Postinterpretation respondents' description of the landscape observed on Laird Campus at the University of Delaware, Newark as compared with their level of interpretation engagement (none, low-viewed one type of interpretation, and moderate/high-viewed two or three types of interpretation).

	Level of engagement						
	None		Low		Moderate/high		
Landscape description	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	*P*
Messy	91	9	79	21	65	35	0.031*
Low maintenance	73	27	58	42	35	65	0.006*

*Indicates significantly different response distributions at the 0.05 significance level.

and Kendle, 2006; Parsons, 1995). Further work is needed to define appropriate methods of addressing aesthetic issues when pursuing sustainable landscaping.

Students did not differ substantially in their overall rating of the landscape's maintenance after the interpretation campaign, and the majority of postinterpretation respondents (83.7%) considered the landscape's maintenance to be above average, and 94.1% considered the landscape to be at least somewhat well maintained. After the interpretation campaign, students were more likely to consider the landscape at least somewhat low maintenance. This increase was likely a result of the interpretation campaign because postinterpretation respondents who engaged with increasing levels of interpretation were more likely to consider the landscape low maintenance than respondents who did not engage in any interpretation (P = 0.006) (Table 4). The interpretation designed for this study highlighted reduced inputs into the landscape as a benefit of sustainable landscaping practices; therefore, the interpretation was effective in conveying this point to the respondents.

Conclusions

Before the sustainable landscaping interpretation campaign on Laird Campus, the majority of students living in Independence Hall perceived the landscape to be attractive, sustainable, well maintained, and functional. The majority of students also considered the landscape at least somewhat sustainable, but the majority was unaware of sustainable landscape management on Laird Campus. The majority of students considered sustainable landscaping practices definitely acceptable for incorporating on Laird Campus. Of the sustainable practices implemented on Laird Campus, reduced mowing was identified as the least likely to be considered acceptable by students without any interpretation. The large majority of positive student perceptions captured in this study offers encouragement for the use of sustainable landscaping practices on college and university campuses.

As a result of the interpretation campaign, students living in Independence Hall were significantly more aware of sustainable landscaping practices on Laird Campus. The majority of students still considered the landscaping to be attractive, sustainable, well maintained, and functional. After the interpretation campaign students were even more accepting of incorporating specific sustainable landscaping practices on Laird Campus, especially rain gardens, reforestation, native plantings, and reduced mowing. Respondents who engaged with higher levels of interpretation were more likely to consider specific sustainable landscaping practices acceptable for implementation on Laird Campus. This result demonstrates that changes in attitudes toward landscape management and desires for implementing sustainable practices are greater with increased engagement with interpretative materials. In regards to altering student perception of the sustainable landscape, the overall finding of this research concludes that 1) campus sustainable landscaping interpretation can improve student awareness and acceptance of sustainable landscaping practices, and 2) changes in student's perception of landscapes are greater as engagement with interpretation materials are increased. For those developing or managing sustainable landscapes in public sites (like university campuses), interpretation aimed at landscape users is useful for enhancing acceptance of those landscapes.

Results of this research also provide additional insight into aesthetic acceptance of sustainable landscapes. Though students were more accepting of incorporating sustainable landscaping practices on Laird Campus after the interpretation campaign, they were also somewhat more likely to consider the landscape messy and somewhat less likely to consider the landscape attractive. This study illustrates the complex relationship between acceptance of sustainable practices and the acceptance of new aesthetics in the effort to promote widespread acceptance of sustainable landscapes. The interpretation developed for this study primarily identified and explained the benefits of sustainable landscaping practices on Laird Campus. The interpretation campaign was successful in increasing students' awareness and acceptance of sustainable landscaping on Laird Campus. However, the campaign did not significantly improve students' perception of the landscape's appearance. This suggests that future campaigns interested in promoting the aesthetic acceptance of sustainable landscapes may require interpretation directly addressing aesthetic issues in addition to interpretation of the environmental benefits.

Sustainable landscapes provide a variety of benefits, one of which is reduced maintenance cost. Since this research showed that interpretation improved acceptance, the cost of that interpretation must be included when calculating savings. In this case, interpretive signs (5) were funded through a sustainability grant. At a cost of $250 per sign, the interpretation cost of $1250 would be offset in 1 year if 1 acre was mowed once instead of 10 times (yearly savings of $3920.40) (Barton et al., 2005). Students on a university campus who receive interpretation about sustainable landscapes are more likely to accept the immediate landscape, but more importantly have increased their understanding about the benefits of sustainable landscaping and are potentially more likely to be accepting of those landscapes in other situations.

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