Teens and Conservation: Can a Hands-On Approach to Conservation Education Encourage Teens to Become Optimistic about Conservation?

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Abstract

Teenagers are open to conservation messages, and some are quite enthusiastic about the environment, animals, and saving the world. The challenge is harnessing that enthusiasm, while educating them about the complexities of many conservation issues. Students can be given a realistic view of global environmental problems, as long as they are also given concrete, practical ways to have an impact on the issue. For this Inquiry Action Project, I investigated whether a course on Hands-On Conservation for high school students would increase their optimism about their ability to positively impact the world and increase their environmental attitudes and actions overall. Students were given a pre-test and post-test survey to assess their environmental actions and attitudes, and in between, they participated in a six week course focused on three global conservation issues and everyday actions the teens could take to positively affect those issues. No significant differences were found in the scores, though actual means on the survey sections were generally higher after the course than before the course. The survey measure that was the closest to showing a significant difference was on the students' level of optimism about the future and their ability to make a difference in the world. Additionally, after the course, students reported an overwhelmingly positive attitude about what they learned and how strongly they felt they could make a difference in the world. Overall, the course was a great success that produced several great student-designed community conservation projects, and it demonstrated that teenagers are, in fact, quite capable of producing high-quality, inspirational conservation actions.

Introduction

Teenagers are in a transitional period between childhood and adulthood. In childhood, people tend to do as they are told by adults; in adulthood, people have complete freedom over their behavior and choices. It is during the transitional period between the two stages that teenagers tend to form behaviors and beliefs that last into adulthood. Additionally, teens have the ability to educate and positively influence their peers, and even adults, through their conservation actions (Ballantyne, Connell, & Fein, 2006). In this manner, they can directly impact their social circle and become conservation leaders without stepping too far outside of their comfort zone. Often, adults do not take teenagers seriously or doubt their abilities and commitment to serious issues, such as conservation. However, as the coordinator for two long-term teen programs at the Pittsburgh Zoo & PPG Aquarium, I have come to recognize that not only do teenagers represent the future of conservation, but they are more than capable to be leaders of conservation efforts today. When teens are passionate, informed, and working toward a good cause, adults and peers alike come to respect, learn from, and join their efforts to create a better, cleaner, and greener community and world.

It is this realization that has informed my goals and objectives for the KidScience and Zoo U. programs at the Pittsburgh Zoo, and it has led me to a series of Inquiry Action Projects to investigate my students' conservation actions and attitudes. In 2009, I assessed and compared the environmentally-minded attitudes and actions of my middle school-aged KidScience students with my high school-aged Zoo U. students. I found that my high school students, most of whom actually started taking classes as KidScience students, were more environmentally-aware and more likely to participate in environmentally-friendly actions than my middle school-aged students. The increased scores for older students supported my hypothesis that students would grow in conservation-minded attitudes and actions, as they grew and continued throughout the programs (Revak, 2009).

In 2011, I reassessed my Zoo U. students. I compared the 2011 Zoo U. students' results to the KidScience and Zoo U. results of 2009, as many of the students assessed in the initial study had either moved up from KidScience to Zoo U. or were upper class Zoo U. students in 2011. The findings in 2011 were somewhat mixed. While most of the measurements showed that Zoo U. students in 2011 did, in fact, show slightly more conservation-minded actions and attitudes than either group in 2009, the differences were not always significant. On some measurements, there were no differences at all (Revak, 2011).

Because most of the students had taken two additional years of conservation education courses, and they had grown in personal and financial independence throughout their teen years, I was somewhat surprised that the results were not more significantly different. I worried that the reason the results in 2011 were not more positive was that the students may have started to get overwhelmed by all of the conservation issues facing the world. I was concerned that though they had learned more, they were not doing more because they felt like they were too small or insignificant to make a difference in such complicated environmental issues. Studies, such as Hicks & Holden (1995), demonstrate that if children are presented information on the negative issues facing our planet, they tend to view the future pessimistically, especially if they are not given examples of optimistic solutions or ways in which they can positively impact the issues.

For the current Inquiry Action Project, I designed a course to give the Zoo U. students practical, hands-on actions that they could take in their everyday lives. The intention behind the course was to allow students to discover small solutions to big problems, which may prevent them from feeling hopeless and encourage them into action. Many young people tend to be passionate about the environment, and they are even well-educated and informed on the complex issues facing the planet. However, they do not feel confident in their ability to contribute to positive environmental changes (Connell, et al., 1999). Additionally, people are usually willing to make changes in their behavior to benefit the environment only if the changes are directly beneficial to them and do not require them to make drastic changes to their lifestyle or daily habits (Kollmuss & Agyeman, 2002). The spring 2012 Zoo U. course, titled “Impact Your World: Hands-On Conservation”, was designed with the above ideas in mind.

Students were introduced to three global conservation issues throughout the semester: Palm Oil, Sustainable Seafood, and Conscious Consumerism. They examined many actions and small behavior changes they could make in their daily lives to address each of those issues. I assessed the students’ conservation attitudes and actions both before and after the course, with the following question in mind: Will Zoo U. students’ conservation attitudes, actions, and optimism positively increase after taking a six-week Hands-On Conservation course? Swaisgood and Sheppard (2010) suggested that those who have a feeling of control or ownership over a situation are more likely to feel they can make an actual impact on the situation. I hoped that by exploring small, practical solutions to large issues, the feeling of helplessness would be replaced with a feeling of being empowered. I anticipated seeing that by

showing students that they could be environmentally-friendly in their daily, teenage lives, they would become more likely to be conservation leaders in their communities.

Methods

A survey to assess the students' commitment to conservation was developed and administered to students on their first day of class for the Spring 2012 semester and again on their last day of class. Students were also given a course evaluation form on their last day of class in Spring 2012.

The survey was originally developed in 2009 for use with my prior Inquiry Action Project, and it incorporated materials and resources obtained through a previously taken Global Field Program course (Revak, 2009). Additionally, the survey was used again in 2011, as part of another Inquiry Action Project to assess the change in conservation attitudes and actions in the students over a two year period (Revak, 2011). Because the survey had been piloted in several previous projects, and it returned valuable data, I felt confident administering it in Spring 2012. The final section of the survey was developed specifically for this assessment, however, and the opening statement, regarding the survey being voluntary and anonymous, was added to comply with Collaborative Institutional Training Initiative (CITI) Training protocols.

The basic content and outline of the survey was initially developed prior to Fall 2009, but the survey was drastically edited and refined as a result of examining survey techniques and procedures for a Community Engagement Lab activity in the Conservation Science and Community (CSC) class (Revak, 2009). CSC class materials informed the piloting, editing, and implementation of the surveys (Schultz, 2001). The survey was piloted with staff members in the Conservation Education Department at the Pittsburgh Zoo & PPG Aquarium in 2009, and the additional survey section was piloted with some of the same staff members in 2012. Staff members responded to the survey, and they provided feedback regarding any clarifications that should be made, any statements that were confusing or misleading, and general critiques of the survey. The structure and content of the survey was edited accordingly at that time. Surveys were then administered to students in the KidScience and Zoo U. programs in October 2009 to assess their conservation attitudes and actions (Revak, 2009). Because the survey was clear, concise, and produced compelling results in 2009, it was not modified before being given to students in October 2011. Before administering it to Zoo U. students in Spring 2012, a new section of the survey was added to address specific goals of the Hands-On Conservation course and to assess student optimism about affecting change, while the rest of the survey

remained unchanged from 2011 and 2009. The new section was placed at the end of the survey.

The survey included several segments, which were designed to measure different aspects of environmental commitment and concern. Many of the survey statements and questions on the original survey were taken and modified from those found in studies by Dunlap, et al. (2000) and Maloney & Ward (1973). The Scale survey section was designed to assess students' understanding of environmental issues and to measure their general worldview (Dunlap, et al., 2000.) The Potential section was designed to measure what students indicate they would be willing to do for conservation. The Yes/No section and the Actual portion of the survey both measure the behaviors students currently do or have done for the environment. The Affect survey section measures students' emotion and attitude toward conservation (Maloney & Ward, 1973; Revak, 2009; Revak 2011.) The final page of the survey, the Optimism section, was the only update or addition to the survey from past years. It was designed to measure student optimism about being able to affect change and to assess the primary goals I had for the Hands-On Conservation course. The statements for the Optimism section were written by me, and they were evaluated and critiqued by coworkers in the Conservation Education Department at the Pittsburgh Zoo & PPG Aquarium prior to being administered to students in the survey. (See Appendix 1—Section titles added only for this report, they were not labeled on student copies).

The course evaluation form is modified from a form that is familiar to returning Zoo U. students. At the end of every Zoo U. course, students are asked to anonymously give feedback about the course they recently completed. This information is used to update and edit the course before it is offered again in the future. Though most of the questions are ones that are typically asked on Zoo U. course evaluation forms, for the Hands-On Conservation course evaluation I added questions to assess whether they feel more positive about conservation and their ability to make positive changes (see Appendix 2). The information gathered from this course evaluation form will serve as qualitative data regarding students' attitudes and actions at the completion of the course. The program evaluation survey was assessed with a rubric inspired by rubric templates included in Mertler, 2001 (see Appendix 3). Additional qualitative data will be included in the form of information about conservation projects designed and carried out in the summer of 2012 by former Hands-On Conservation course students, and these projects will be further described in the IAP Action Component section.

The population surveyed for this project were the students in the Spring 2012 "Impact Your World: Hands-On Conservation" course at the Pittsburgh Zoo & PPG Aquarium. The 20 students in the course ranged in age from 14- to 18-years-old (8th grade to 12th grade). Fifteen students were female, while five were male. The total number of students completing the pre-test survey was 16, and the total number of students completing the post-test survey and course evaluation form was 15. Eighteen of the 20 students in the course were long-term students of the KidScience and/or Zoo U. programs at the Pittsburgh Zoo & PPG Aquarium. Two students in the course were taking a Zoo U. course for the first time. Both new students were female.

Data analysis was completed using Microsoft Excel. For all sections of the survey, mean and standard deviation were calculated. To compare the pre-test and post-test survey results, a paired t-test was also performed in Microsoft Excel (Revak, 2011).

Results

The Scale section of the survey was a Likert-style scale that asked students to rank statements from 1 to 5, with one being 'strongly disagree,' three being 'I don't know,' and five being 'strongly agree'. The scoring on questions 3, 5, 7, 9, 12, 14, and 15 was reversed, as the wording of the statements was such that disagreement with the statement reflected a pro-environmental view. The other eight questions reflected wording in which agreement would indicate a pro-environmental view (Dunlap et al, 2000). The responses were added up on each survey and divided by the number of statements in the section, which was fifteen, to obtain the mean score for an individual student (Revak, 2009; Revak, 2011). All student scores were then averaged to obtain the total mean for pre- and post-. The students scored higher on the Scale portion of the survey after the course (M=4.10, SD=0.39) than they did prior to the course (M= 3.99, SD= .39), though the difference was not significant $t(15) = -0.91$, $p<0.378$.

The Yes/No portion of the survey measured behaviors actually carried out by the students. Respondents were given one point for each 'yes' reported. Because there were seven statements in the section, a maximum of seven points were possible (Revak, 2009; Revak, 2011). The 'yes' responses reported by a student were totaled, and the totals were averaged to obtain a mean for all students. In this section, students again scored higher after the course (M=5.27, SD=.8) than before the course (M= 4.94, SD= 1.12). The difference, however, was not significant $t(15)= -0.83$, $p< 0.420$.

The Potential, Actual, and Affect portions of the survey were presented as statements. For each statement, students responded by writing true or false to indicate agreement or

disagreement. Potential measured what students indicate they are or would be willing to do for the environment. Actual measured what behaviors the students report having actually performed. Affect measured how students feel about environmental issues. Students were given one point for each statement that matched a pro-environmental perspective. The numbers of points reported by students were totaled to obtain individual student scores for each section, and the totals were averaged to obtain a mean for all students for each section (Revak, 2009, Revak 2011).

Students scored higher on the post-test for both the Potential section (M= 5.93, SD= 1.75) and the Affect section (M= 8.27, SD= 1.44) of the survey, compared to the pre-test scores on the Potential section (M=5.31, SD=1.62) and the Affect section (M=7.69, SD= 2.33). Again, neither difference was significant (Potential $t(15)$= -1.05, p <.310) and (Affect $t(15)$ = -1.05, p<.309). Students actually scored lower after the course (M= 5.8, SD= 1.86) on the Actual section of the test than prior to the course (M=6, SD=1.71), but there was no significant difference, however, $t(15)$=.29, p<.776.

Finally, the Optimism section of the survey was designed to assess whether the students had an optimistic view of their ability to affect change and address local or global conservation issues. Again, a Likert-style scale was used. The Optimism section asked students to rank statements from 1 to 5, with one being ‘Strongly Disagree,’ three being ‘Not sure/Neutral,’ and five being ‘Strongly Agree’. The scoring on questions 3, 5, 9, 10, 12 were reversed, as the wording of the statements were such that disagreement with the statement reflected an optimistic view. The other eight questions were worded such that agreement would indicate an optimistic view. The responses were tabulated on each survey and divided by the number of statements in the section (n=13) to obtain the mean score for an individual student. All student scores were then averaged to obtain the total mean for pre- and post-surveys. Again, students scored higher after the course (M=4.21, SD=.37) than before the course (M=4.02, SD=.35), but as with all of the above survey sections, the difference was not significant, $t(15)$= -1.51, p<.152 (see Table 1).

Table 1. Means and Standard Deviations for Survey Portions, Pre- and Post-Test. Student Means increased on the Post-Test for all sections except Actual

Hands-On Conservation 2012 Survey Results													
		Scale		Yes/No		Potential		Actual		Affect		Optimism	
	Total points possible	5		7		8		10		10		5	
		Mean	*St. Dev.*	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*	*Mean*	*St.*	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*
Pre-Test	N=16	3.99	0.39	4.94	1.12	5.31	1.62	6	1.71	7.69	2.33	4.02	0.35
Post-Test	N=15	4.1	0.39	5.27	0.8	5.93	1.75	5.8	1.86	8.27	1.44	4.21	0.37
		t(15) = -0.91, p<0.378		t(15)= -0.83, p< 0.420		t(15)= -1.05, p <.310		t(15)=.29, p<.776		t(15) = -1.05, p<.309		t(15)= -1.51, p<.152	

It may be interesting to note, as well, that students generally scored higher on both the pre-test and post-test survey than did the 2011 Zoo U. students (see Table 2). For the most part, the students in the spring Hands-On Conservation course were also students in the fall of 2011, and they would have taken the survey at that time. The increase in scores from the fall to the spring is encouraging, particularly as it could indicate that the kids who elected to take the Hands-On Conservation course are the most conservation-minded members of the Zoo U. student population.

Table 2. Means and Standard Deviations for Survey Portions administered to Zoo U. students, Fall 2011, to be used as a comparison to 2012 results.

2011 Zoo U. Survey Results										
	Scale		**Yes/No**		**Potential**		**Actual**		**Affect**	
Total points possible	5		7		8		10		10	
	Mean	*St. Dev.*	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*	*Mean*	*St. Dev.*
N=35	4.05	0.33	4.74	1.14	4.71	2.2	5	1.74	7.41	1.86

As the “Optional” section of the survey was of particular interest in the study, I further analyzed the responses, by comparing the pre- and post- test scores on individual statements in the survey. For approximately half of the questions, mean scores increased after the course (Questions 1, 2, 3, 4, 5, 6, and 11). Curiously, there was almost no change on two of the questions (Questions 7 and 10), and for four of the questions, the scores actually decreased after the course (Questions 8, 9, 12, and 13).

Table 3. Means and Standard Deviations for Individual Questions on the Optimism Survey Section, Pre and Post Test.

Optimism Section														
	Question 1		**Question 2**		**Question 3**		**Question 4**		**Question 5**		**Question 6**		**Question 7**	
	Mean	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*
Pre-Test	4.31	0.79	4.5	0.52	4.06	0.99	3.88	1.09	3.75	0.93	3.75	0.45	3.81	1.16
Post-Test	4.43	0.85	4.71	0.47	4.64	0.63	4.36	1.08	4.21	0.7	4.29	0.47	3.82	1.03
	Question 8		**Question 9**		**Question 10**		**Question 11**		**Question 12**		**Question 13**			
	Mean	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*	*Mean*	*St. Dev*		
Pre-Test	4.13	0.81	4.5	0.52	4.06	1.29	3.75	1.25	3	1.46	4.75	0.45		
Post-Test	4.07	0.62	4.28	0.83	4.07	1.27	4.29	0.73	2.54	1.25	4.71	0.47		

There were no statistically significant differences on any of the individual questions, which supports the fact that the overall pre- and post-test "Optional" section score difference was not significant. However, even though the differences were less than one point and in most cases, less than a half of a point, it is interesting to see the trends that appeared on the survey once the questions were analyzed individually (see Chart 1 and Appendix 1 for the questions in the Optimism section).

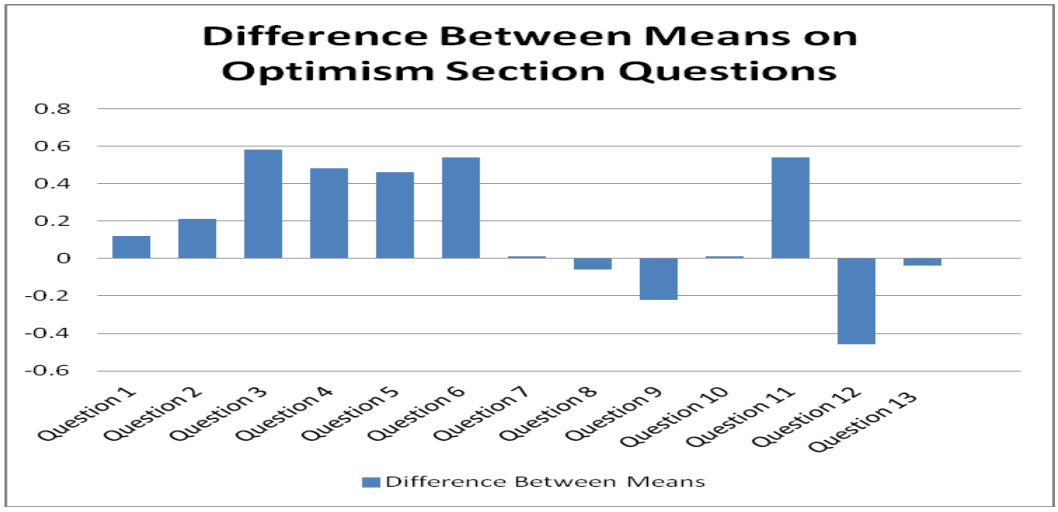

Figure 1. Difference between Means on Questions in the Optimism Section of the Survey

Additionally, qualitative data were obtained from students through a program evaluation administered to the students on the last day of class. Students were asked to report on such questions as: "Do you feel more optimistic about being able to make a positive difference in your community or in the world?", "Has this course inspired you in any way? If so, how? If not, why

not?", and because students were asked to write both personal and community conservation pledges throughout the course, they were asked, "Have you kept your conservation pledges? Please explain." The anonymously obtained student conservation pledges can be found in Appendix 4.

The student responses to the Zoo U. Program Evaluation questions were assessed using a rubric informed by Mertler, 2001 (see Appendix 3). Because only the last three questions of the survey directly addressed student optimism and conservation intentions, only those three questions were assessed with the rubric.

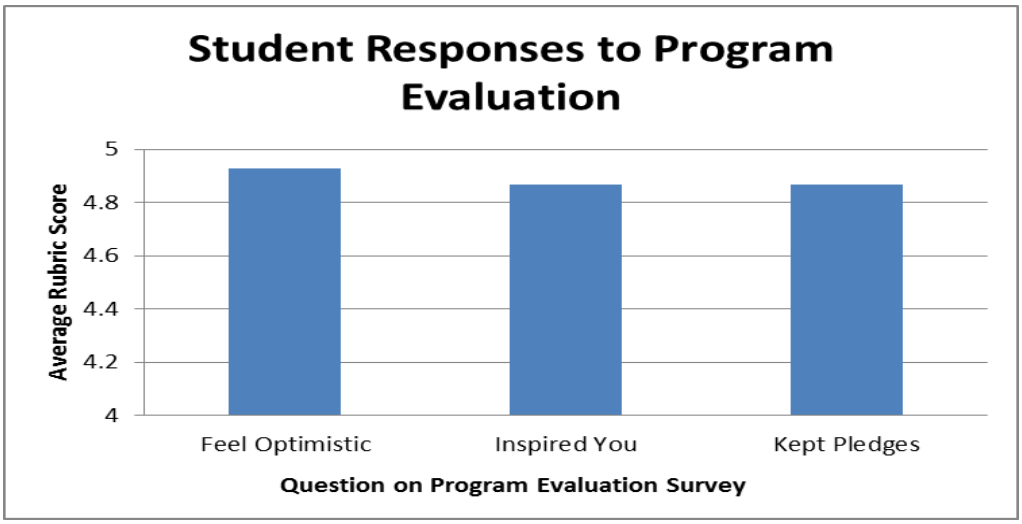

Figure 2. Average student rubric score for each question of the survey that directly addressed conservation attitudes and actions after the course.

As is apparent in Figure 2, the scores for all conservation questions on the survey were extremely high. Of the 15 students, 14 students scored a 5, or shared only positive responses on the question addressing student optimism, while only one student scored a 4, which indicated that the student shared mostly positive responses, with one or more neutral views, as well. Examples of responses that were scored as a 5 include, "I do! I feel that the course really showed me how much I haven't been doing and how much that I can" and "After taking the Hands-On Conservation Course, I definitely feel more optimistic in being able to make a positive difference in the world. We learned that just one person can make a change and I still believe that this is true." Other 5 scores were given to simple answers, such as "Yes" or "Yes, I do." The response that was scored as a 4 was, "I do feel more optimistic about making a difference in my community. There are always people who will never work toward conservation, but I can do my part to inspire those who will."

On both the inspiration question and the question that addressed whether students had actually kept their pledges, thirteen of the fifteen students scored a 5, and only two scored a 4. An exceptional example of a 5 response on the inspiration question is as follows:

> "This course inspired me to follow my dreams of studying cheetahs in the wild through the Cheetah Conservation Fund as well as working in the education department of zoos to teach students about conservation. For both years that I have completed conservation projects through Zoo U., I learned that education is the best way to spread the message of conservation. Once that is done, you can actually get out in the field and start working one-on-one with the problem. I realized through this class that I can teach so many students about conservation and have them teach their families and friends, and then those people can spread the message on. Eventually, everyone will know what the problem is and how to fix it. If I can be just a minor part of that process, I would feel incredibly honored. That is exactly what this course has inspired me to do—to go out there and teach people about conservation."

One of the responses that scored a 4 for the inspiration question was, "I feel inspired to teach others about issues that we learned about in class, though I wish we had learned more about well-known issues like deforestation, since we spent so much time on palm oil."

Regarding whether the students had kept their conservation pledges, 5 responses ranged from a simple, "Yes" or "I have" to the following example: "My family and I are recycling a lot more. Also, I am a very big advocate for the Palm Oil crisis. We do not buy anything with palm oil in it. I also want to begin sending letters to various companies. I have also been sharing the palm oil crisis with my friends and extended family." An example of a 4 response includes, "I did keep a few of them, though I have not kept all of them yet. I do plan on trying to do more to keep all of my pledges."

Discussion

Overall, the mean scores on nearly every section of the survey were higher on the post-test than on the pre-test. However, in no cases were the differences significant. Because I sought to demonstrate that students would have an increased positive outlook on conservation attitudes, action, and optimism after taking the six week course, these data did not support my hypothesis. While initially encouraging, as the means did seem to increase after the course in most cases, the increase was not statistically significant. Perhaps these results could be due to the small sample size of students who attended the course and completed both the pre- and post-survey. Another potential confounding factor could be that because the students elected to

take the course, they were already extremely conservation-minded and active in conservation efforts. Due to their already positive outlook, there was not much room to grow during and after the course. However, I have doubts that the students could not possibly be more conservation-minded than they were prior to the course. Based on student action pledges and student feedback on the surveys, there was room for improvement despite scoring very high in most measures.

Perhaps the reason the Action section score was the only one to decrease after the course can be explained by the fact that the number of post-surveys returned was less than the number pre-surveys. The small sample sizes (n=16 for pre-, n=15 for post-) mean that each individual response counts for a relatively large proportion of the response scores. Additionally, for both the pre-test and post-test, the standard deviation was relatively high and actually increased for the post-test (pre- *SD*=1.71, post- *SD*=1.86). Also, perhaps since not all students in the course completed pre- and post-test, there may have been a difference in individuals who submitted surveys each time. Regardless, it is interesting to see how the scores changed after the course was offered.

The one survey measure that was the closest to being statistically significant was the measure of student optimism in the ability to affect change and become a conservation leader. As this was the newest measurement included in the survey, and it was the measurement most inspired by research prior to designing the course, this section represented one of the primary interests in this study. Once I discovered that the Optimism section did not show a significant difference between the pre- and post-survey, I analyzed the results of that section by each individual question. While again no significant differences were observed on individual questions before or after the course, there were still some interesting findings. Approximately half of the scores did go up after the course, and it was interesting to see which questions had the largest pre-course and post-course differences. However, there was almost no difference in two questions at all before and after the course, and on four of the questions, scores actually went down after taking the Hands-On Conservation course.

The two questions that did not show a change at all, with only .01 point difference between the pre- and post-test, were Question 7 (“My friends and/or family members are environmentally conscious and support my efforts to make a difference in the world.") and Question 10 ("I am unwilling to alter my lifestyle to help the environment."). For Question 7, it is not surprising that the scores did not change after the course, as perhaps students’ family and friends could not be expected to be affected by the course materials. In both cases, the mean

student response was a high 3-point score (pre- *M*=3.81, post- *M*=3.82), which equaled a response of “Neutral/Not Sure” and nearing “Agree”. It appears that students have some support at home and in their social network for the conservation efforts and behavior changes they would like to make, but they are somewhat unconvinced that family and friends are fully on-board with their goals. The lack of strong support from family and friends is a concern, as parents’ environmental attitudes and actions are directly correlated with the environmental attitudes and actions of their children, particularly female children (Leppanen et al., 2012; Ballantyne et al., 2006). As 15 of the 20 Hands-On Conservation students were female, it is reasonable to believe that social support and cultural expectations may be a primary factor influencing their current environmental interest and future growth in conservation behaviors and leadership.

The lack of change for Question 10 ("I am unwilling to alter my lifestyle to help the environment.") is more difficult to explain. With pre-test and post-test means of just over 4 (pre- *M*=4.06, post- *M*=4.07), which equates to a response of “agree”, the students indicate that despite their strong conservation education and views, they are unwilling to make any drastic lifestyle changes to be more environmentally-friendly in their behavior. This actually correlates strongly with findings reported by Kollmuss & Agyeman (2002). People mean well, but in reality, unless the conservation actions are easy and do not represent a disruption to their normal routines, they are unlikely to change their behaviors. Because it is a documented phenomenon, it is not surprising that my students indicate that they are unwilling to make lifestyle changes to be more conservation minded, but it is somewhat disappointing.

Four questions on the survey actually showed a decrease in scores from the pre-test to the post-test. The two questions that showed the largest decrease were Question 9 (“I have no control over the future of the environment”) and Question 12 (“I considered how I might be expected to respond when completing this survey”). In both cases, the statements were reverse scored; disagreement with the statement actually demonstrated a more optimistic viewpoint. Admittedly, the wording on Question 12 was a bit unclear, despite having been reviewed by staff members prior to being administered to students. The intention of the question was to ascertain whether the students were only responding the way they thought I wanted them to respond or whether they were being completely genuine in their responses. However, during data analysis, it was somewhat unclear as to whether that statement should be reverse scored or not. Perhaps the students were unclear as to how to best respond to the statements or perhaps the decrease in score truly reflected the students’ feelings after the course.

The fact that approximately half of the survey questions showed positive change after the course was encouraging, however, especially when taking the content of the questions into account. Five of the statements showed an approximately half-point increase after the course, all of which took the responses from mildly “agree” or closer to “not sure/neutral” to closer to “strongly agree”. The statements that showed the largest post-test increase are as follows: Question 3 (“Until governments or corporations change their actions, it is useless for individuals to change their behaviors”), Question 4 (“I am willing to take a leadership role at school or in my community”), Question 5 (“Environmental problems are so complicated that individuals cannot adequately address them”), Question 6 (“I consider how my choices affect the environment before making purchases, choosing transportation, and/or going about daily activities), and Question 11 (“I understand that environmental concerns are complex, but I do not let the complexities overwhelm me into inaction”). It is also important to note that both Question 3 and Question 5 were reverse scored, which may indicate that the students were not confused by the wording of the questions after all.

Students seem to be indicating that they want to make a difference in the world and become leaders in their community, though they recognize the many challenges that exist. The complex survey results also mirror the complexities inherent in understanding exactly what factors influence one’s conservation attitudes and actions, even after becoming well-educated about environmental concerns (Kollmuss & Agyeman, 2002).

After considering the mixed quantitative results of the survey responses, the qualitative results of the program evaluation become much more informative and encouraging. On every single evaluation form submitted, students reported overwhelmingly positive feedback about the course, their optimism toward the environment, and their ability to make a meaningful change in the world (see Figure 2). The tremendously positive feedback went far beyond what I had expected to see, even after hearing the students speak so highly of their experience. I did not receive one negative feedback about the course or how students felt about conservation. Some students indicated that they wished the course was longer, that they had more time to discuss the topics, or had time to delve into additional topics, but none of the students indicated that they felt anything but positive about the issues discussed in the course and their ability to address them. Course evaluations for previous courses offered through the Zoo U. program have received some negative feedback from students, which serves to demonstrate that students are not simply sharing the positive and withholding the negative on the anonymously submitted forms.

In addition to responding to the specific program evaluation questions, many students wrote additional and optional comments at the end of their evaluation to praise the course. One student wrote, “I really loved this course so I think you should absolutely offer it more often. All of the discussions we had in class were great too! I thought it was such a great way to get us involved and learning at the same time.” Another indicated, “The Hands-On Conservation course showed me exactly how I can make the most earth-conscious decisions to impact my life and the world for the better.” One student actually wrote, “This class was amazing! I loved this class! Thank you Mandy!”

Students also reported that they felt that the information they learned in the course would be something they would carry with them in the future: “…This course didn’t finish after the 6th class—it will continue for the rest of our lives.” The goal for the Hands-On Conservation course was to create an environment through which students felt empowered to make a difference in the world through their actions and attitudes, both presently and throughout the rest of their lives. Though the qualitative survey responses did not show scientifically significant score increases after the class, the ultimate goal of the course has been accomplished, based on the extremely favorable program evaluation responses and the concrete actions taken by the students both during and after the programs completion.

Action Component

Part of the course requirements for the Hands-On Conservation course included completing a community conservation action to share the students’ education with the greater community. To fulfill the requirement, the students decided to create educational materials to be shared and passed out at tables in the Pittsburgh Zoo & PPG Aquarium. The tables and materials featured information about two of the topics examined in the course: Palm Oil and Sustainable Seafood. The palm oil table was set up in the Tropical Forest Complex directly in front of the Borneo Orangutan exhibit, and the sustainable seafood table was set up in the PPG Aquarium. Students who chose to staff the sustainable seafood table ended up splitting into two groups, as half of the students stayed at the table in the PPG Aquarium and half of the students stood at the Seafood Watch-inspired display at the Water’s Edge exhibit (see Appendix 5-7). Both tables were staffed on the final day of class, Saturday, April 14th and again during the Zoo’s Party for the Planet Earth Day Celebration the following Saturday, April 21st. Though the Earth Day session was entirely optional and required students to come to the Zoo on an extra Saturday beyond the normal class session, it was very well attended. Fifteen of the 20 students in the course volunteered to work at the tables on the Earth Day session.

After the completion of the course, five of the students designed and carried out community conservation projects, which were then submitted for the Pittsburgh Zoo & PPG Aquarium's Conservation Leadership Award (CLA). The CLA was designed in the spring of 2011 as a Leadership Challenge project, and it is intended to reward students who show conservation leadership by carrying out community conservation projects. In its first year, only one project was submitted for the award. In 2012, five projects were submitted, and all of the projects were designed and carried out by alumni of the Hands-On Conservation course.

The 2012 projects reflected a wide variety of conservation issues and efforts. One student designed a website to educate people about palm oil. Another student worked with avian researchers at a local nature preserve to investigate bird calls. A third student planted a native plant garden in a local state park. One student designed a stuffed animal with anatomically correct internal organs to be used to teach children about animal anatomy. The fifth student placed and monitored two nesting boxes for Eastern Bluebirds in a cemetery in her neighborhood. The winning project, focusing on Eastern Bluebird nesting boxes, was chosen by the CLA Evaluation Committee because it addressed an important conservation issue, and it most directly incorporated local leadership into the project, as the student had to speak to local commissioners to obtain permission to place the boxes. It was also a project that would be considered feasible by many young people, which would hopefully inspire future teenagers to participate in a similar effort.

One student even took her interest in palm oil even further, as she arranged a meeting with the Curator of Conservation Education, the Catering Manager for Service Systems Associates (the foodservice contractor for the Pittsburgh Zoo), the lead orangutan keeper, and me to discuss moving the Pittsburgh Zoo & PPG Aquarium forward as a leader in palm oil awareness. The meeting was designed to fulfill a requirement leading up to her Girl Scout Gold Award project. For her requirement, she had to investigate an issue that was important to her and propose a solution to that issue to people who have the authority to make a difference. She chose palm oil as her topic, and her primary goal for the meeting was to propose that the Zoo not use palm oil in its food. She also suggested that signs be created to spread awareness about the issue and to promote the Zoo's palm oil free position.

The proposal was extremely well-received by all involved in the meeting. The catering manager indicated that Service Systems Associates already does not use palm oil when possible, and because he is passionate about conservation, he would ensure that more is done to publicize information about why palm oil is not used on Zoo grounds and why it is harmful to

the environment. Additionally, several of the participants in the meeting, including myself and the lead orangutan keeper, have continued to meet with the intention of creating a solid public position for the Pittsburgh Zoo & PPG Aquarium on the topic of palm oil. Tentatively titled, “The Pittsburgh Palm Oil Awareness Project,” we hope to become a leader in conservation and education on palm oil by creating awareness within the Zoo and by creating partnerships around the Greater Pittsburgh Area with organizations who may also have a stake in sustainable palm oil.

“Impact Your World: Hands-On Conservation” has been a wildly successful program, and the actual outcomes of the course far surpassed my goals and expectations. The course succeeded in empowering students to make a difference in the world, engaging students in local conservation projects, and creating leaders in their community. It also served to educate zoo visitors about conservation issues, and it even brought Zoo staff members together to discuss ways to ensure that the Pittsburgh Zoo & PPG Aquarium maintains and increases its position as a local and worldwide leader in conservation.

Teenagers are often not given enough credit for their abilities and their passion. They are our future, but they are also our present. The Pittsburgh Zoo has, fortunately, allowed me to foster my students’ interest and energy for good, and hopefully, now, they will clearly recognize what this will mean for the individual students, the Pittsburgh Zoo, the local community, and ultimately, the world at large. At the beginning of the Hands-On Conservation course I quoted Margaret Mead to the students: “Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.” It is a quote that has inspired me for years. Though now, after the design and implementation of the course, I believe this more than ever before.

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Appendix 1

IMPACT YOUR WORLD
Conservation Attitude & Action Pre- and Post-Test

Please Note: This survey is entirely anonymous and voluntary. You may opt out of taking the survey at any time. The results of the survey will not affect your participation in the program or reflect upon you in any way.*

Scale

Place a number in the left column using the following Scale for each question to estimate how you feel after reading each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Not sure/Neutral	Agree	Strongly Agree

	When humans interfere with nature, it often produces disastrous consequences.
	The balance of nature is very delicate and easily upset.
	The balance of nature is strong enough to cope with the impacts of modern industrial nations.
	Humans are severely abusing the environment.
	The ecological crisis facing humankind has been greatly exaggerated.
	If things continue on their present course, we will soon experience a major ecological catastrophe.
	Human ingenuity will insure that we do not make earth unlivable.
	Despite our abilities, humans are still subject to the laws of nature.
	Humans will eventually learn enough about how nature works to be able to control it.
	The earth is like a spaceship with very limited room and resources.
	We are approaching the limit of the number of people the earth can support.
	The earth has plenty of natural resources if we just learn how to develop them.
	Plants and animals have as much right as humans to exist.
	Humans have the right to modify the natural environment to suit their needs.
	Humans were meant to rule over the rest of nature.

Yes/No
Please answer the following questions with a YES or NO

During the past 2 years, have you…

	Contributed time or money to an environmental or wildlife conservation group?
	Started buying a product because you think it protects the environment?
	Contacted a government agency to get information about the environment?
	Read a conservation or environmental magazine?
	Watched a television program on the environment?
	Learned about a political candidate's position on the environment?
	Recycled newspapers, glass, or other items on a regular basis?

Potential (Statements 1-8)**, Actual** (Statements 9-18) and **Affect** (Statements 19-28)
Directions: Answer each question with **True** or **False**. There are no right or wrong answers. Simply answer with the statement that fits you best.

True or False ?

	When I grow up, I'd be willing to take a bus to work in order to reduce air pollution.
	I would never join a group or club which is concerned solely with ecological issues.
	I would be willing to use a bus system or other mass transit to help reduce air pollution.
	I would ask family and friends to give up driving on a weekend due to a smog alert.
	I'm not willing to go out of my way to do much about ecology since that's the government's job.
	I would donate a week's allowance to a foundation to help improve the environment.
	I would be willing to write my congressman weekly concerning ecologically issues.
	I probably wouldn't go house to house to distribute literature on the environment.
	I have not purchased a product due to its lower pollution impact.
	I keep track of my congressman's and senator's voting records on environmental issues.
	I have never written a congressman concerning pollution problems.
	I have contacted a community agency to find out what I can do about pollution.

	I don't make a special effort to buy products which are sold in recyclable containers.
	I have attended a meeting of a club specifically concerned with helping the environment.
	I have switched products for environmental reasons.
	I have never joined a cleanup drive.
	I have never attended a meeting related to ecology or the environment.
	I (or my family) subscribe(s) to ecological publications (magazines, newspapers, etc.).
	I feel people worry too much about pesticides on food products.
	It frightens me to think that much of the food I eat is contaminated with pesticides.
	It makes me angry or upset to think that the government doesn't do more to help control pollution of the environment.
	The statement "Many species are in danger of becoming extinct if we do not act now." doesn't bother me.
	I become very angry or upset when I think about the harm being done to plant and animal life by pollution.
	I am not bothered by "noise-pollution."
	I get depressed on smoggy days.
	When I think of the ways industries are polluting, I get frustrated and angry.
	The whole pollution issue has never upset me much since I feel it's somewhat overrated.
	I rarely ever worry about the effects of smog on myself and my family.

Optimism

Place a number in the left column using the following Scale for each question to estimate how you feel after reading each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Not sure/Neutral	Agree	Strongly Agree

	I currently have the ability to make a difference in the world.
	I am comfortable being seen in my community, family, or school as environmentally-conscious.
	Until governments or corporations change their actions, it is useless for individuals to change their behaviors.
	I am willing to take a leadership role at school or in my community.
	Environmental problems are so complicated that individuals cannot adequately address them.
	I consider how my choices affect the environment before making purchases, choosing transportation, and/or going about daily activities.
	My friends and/or family members are environmentally conscious and support my efforts to make a difference in the world.
	I will work to make a difference in my community or school.
	I have no control over the future of the environment.
	I am unwilling to alter my lifestyle to help the environment.
	I understand that environmental concerns are complex, but I do not let the complexities overwhelm me into inaction.
	I considered how I might be expected to respond when completing this survey.
	All of my survey responses authentically reflect how I feel at this moment in time.

Appendix 2

ZOO U. PROGRAM EVALUATION

We want to know how we did! Please be honest, no name needed!

Completion of this form is entirely optional and anonymous.

The results will in no way affect your participation in Zoo U.

What did you like best about the Hands-On Conservation course?

What did you like least?

Do you feel you got a good overview of conservation issues? If not, can you say what was missing?

Did you enjoy the in-class activities/tours? Why or why not?

Do you feel more optimistic about being able to make a positive difference in your community or in the world?

Has this course inspired you in any way? If so, how? If not, why not?

Have you kept your conservation pledges? Please explain:

Please add any additional comments here or on the back:

Appendix 3

Zoo U. Program Evaluation Rubric

Score	Description
5	Student response is entirely positive
4	Student response is primarily positive, though it may also indicate neutral views as well
3	Student response is primarily neutral, though it may also contain a few positive or negative views
2	Student response is primarily negative, though it may also include neutral views, as well
1	Student response is entirely negative

Appendix 4
Student Conservation Pledges, Spring 2012

Personal Actions

Research the sustainability of products before buying them

Buy Greener

Eat fresh fruit and veggies and watch what kind of meat I eat

Buy more ecofriendly products by using apps presented in class

Grow a garden; we were thinking of getting chickens and goats for cheese, milk, and eggs

I want to start a compost bin in my house so that my family contributes less waste. We already recycle so I think this would be a good addition to helping the environment

Growing more food in my own backyard garden

I intend to go to our farmers market now that they are starting again

I would like to put my own ideas and knowledge of conservation into action. Compost, minimal trash, and more production of at-home foods. It is difficult without any space or even a yard. I would also like to devote my life towards meeting my own standards of healthy, including my career.

Eat things that use less packaging and that are more healthy

I want to focus on what I have in my home and make sure that my family is eating and using the best products available and try to help others to live healthier lives too.

Go home and go through all my cosmetics and check for health hazards and go through all my food and check for palm oil

Community Actions

Make trails and do cleanups

Get more recycling in school if possible

Talk to my school's newspaper to have them creat an article about palm oil and health hazards in cosmetics and ask school to start a Garden Club

Make recycling readily available

Encourage more people to eat the local farmers' food

In the community, I think there is so much we can do and we can make a big difference in the community by using our Zoo. Fundraisers, events, and anything can be accomplished if we can get a big group of people at the Zoo and convince them of the important issues that need to be taken care of

I would like to reach out to my community by having pot luck lunches (bring and share food, use own silverware, plates, and cups from home) and be involved with a program for children in our city like habitat to plant and grow gardens. The children are immediately affected by their parents andit goes the same for the parents, but it is easier to get into growing and more open minds of younger citizens.

Encouraging simply recycling in schools which can inspire the families of that school to start recycling as well.

I'd like to start buses in our area

I would like to create awareness in my community. I am in the Animal Club at my school and I'm sure many people would be interested in helping the environment so maybe we could create a school garden.

I will recycle more because I usually don't and try to get my neighbors to recycle, too.

Start recycling paper at my school

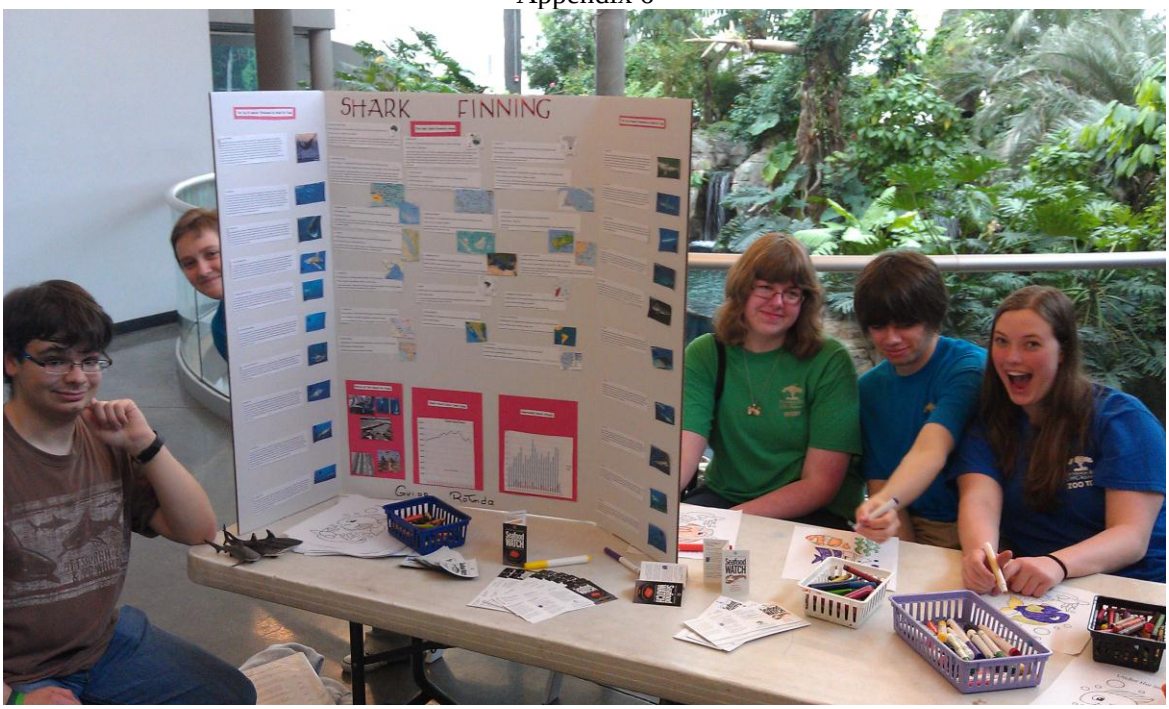
Encourage my friends to recycle and tell them that their cause is worth it

Encourage school to recycle things other than paper

Appendix 5

Students staffing the Palm Oil information table at the Pittsburgh Zoo's Tropical Forest Complex in front of the Borneo Orangutan exhibit.

Appendix 6



Students staffing the Sustainable Seafood information table in the PPG Aquarium.

Appendix 7

Students talking to Zoo visitors about Sustainable Seafood at the Seafood Watch display at the Water's Edge Exhibit.