Blue Crew Water Stewards Workshop Demonstration, November 30, 2012
Final Report

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Executive Summary

The Institute for Environmental Solutions (IES) held the Blue Crew Water Stewards Workshop Demonstration on November 30, 2012 at Mitchell Elementary School in Golden, CO. For this program, IES worked with the entire 6th grade class, which is composed of 67 students in three different science classes. The purpose of this workshop demonstration was to introduce Mitchell 6th graders to IES and contaminants of emerging concern, or CECs. This demonstration will be followed by a three workshop series that will take place with the same Mitchell students in April 2013.

Designed to accompany the 6th grade curriculum, this workshop was relevant to the science curriculum's lessons about water. Teaching the students about water sources, the wastewater treatment cycle, and water contamination through hands-on activities gave students a county required "real world application" of their science curriculum. Specifically, students learned about contaminants of emerging concern. CECs are chemicals found in common household products that may pose serious risks to human and environmental health. IES taught the students that chemicals like triclosan, synthetic fragrance, and BPA may lead to disruption of the endocrine system or various types of cancer. The classes took part in experimentation that improved their understanding of local water contamination. IES provided alternatives to using products that contain CECs. Students learned how to locate CECs on product labels and helped IES staff members make CEC-free hand sanitizer. After the workshop demonstration, students could take home samples of the hand sanitizer and share the easy recipe with their families. The Blue Crew Water Stewards Workshop Program is designed to turn education into action and empower students to make informed decisions about water protection.

The Mitchell Elementary staff and PTA were important to the development of the workshop curriculum. Active parents provided IES with material donations and provided time to aid in program evaluation. The school staff was supportive and interested in the progressive material that IES provided to Mitchell students. IES was thrilled to see enthusiastic involvement from the 6th graders and solid comprehension of the workshop material. IES is excited to return to Mitchell Elementary in April to work with the students further on this subject.

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Acknowledgements

To complete a successful workshop demonstration the Institute for Environmental Solutions needed the cooperation and collaboration of several groups and individuals in Golden, CO. IES would like to thank PTA member, Tracy Fletcher, for meeting with our team multiple times leading up to the demonstration and providing insightful advice and guidance for the program. We also would like to thank her for involving the PTA in the program and securing material donations from parents for the demonstration. Mrs. Fletcher is an important friend of IES and her ambition and progressive attitude has helped our team make an impact at Mitchell Elementary. We thank the Mitchell PTA for providing material donations for the workshop and the workshop observers who were helpful in evaluating the workshop demonstration. We would also like to thank the Mitchell staff and principal. The principal, Samantha Hollman, and the 6th grade science department helped review and improve the workshop design and plan important visits to Mitchell prior to the program start. We greatly appreciate being able to observe 6th grade teacher, Mindy Laster's science class and receive advice from her on the program design. We thank Mindy Laster and the 6th grade science staff for their patience and flexibility while planning the workshop demonstration, and their help organizing and preparing students for IES's visit to their classrooms. The support of the Mitchell staff was vital for the success of the workshop demonstration. Finally, we would like to thank Mitchell's 6th grade students for their enthusiasm and cooperation during our pilot workshop at their school.

Workshop Introduction

Mission

The mission of the Blue Crew Water Stewards (BCWS) Demo is for the presentation to serve as an indicator for the potential success of a subsequent workshop series. It also provides IES with experience to determine the best methods for teaching about CECs to 6th grade students.

Goals

The goal of the BCWS Demo is to develop environmental enthusiasm of students and foster sustainable behavior. IES used science and an interactive lesson plan to encourage students to adopt lifelong environmental habits and concrete actions that will reduce pollution and protect human and environmental health. Hands-on activities were emphasized in the demo to encourage engagement and learning for the students. Students were provided with knowledge about CECs' risks - with actions to make informed decisions about household purchases, and with materials to pass the BCWS message on to their peers, family, and community.

Objectives

1. *Establish collaboration with pilot elementary school*:
Mitchell Elementary positively received the concept of the BCWS. The BCWS program coincides with the countywide "Water" unit for sixth graders and provides students with a required "real world application" component to Mitchell's curriculum.

IES has previously established a partnership with the principal, PTA, and key teachers at Mitchell Elementary School in Golden, CO. In 2011, IES implemented Trees for Healthy Kids and Community, a project that served to reduce air and noise pollution at Mitchell through strategic tree planting. The program involved enthusiastic collaboration among the school, city and county governments, PTA, and community members. The BCWS Workshop Series aims to continue this existing collaboration with the Mitchell Elementary community to reduce targeted CEC-purchasing behaviors. Additionally, IES hopes to expand the BCWS Program with other elementary schools to spread the message of CEC reduction.

2. *Create and implement a workshop demonstration curriculum and evaluation criteria*:
IES has designed a program that aims to maximize student learning and environmental benefit using proven and effective methods. IES created a detailed curriculum for the workshop demo that introduced students to the CEC problem, the BCWS project, and provided ideas on how they can make a daily effort to become better water stewards to reduce their "chemical footprint". The demo curriculum included teaching students about their local water systems, the process of water pollution, and a demonstration of how to make an alternative contaminant-free product. Students were engaged in the BCWS content through hands-on activities and interactive questions. The demo provided a take-home flier for the students that should excite them about the upcoming workshop and help to spread the BCWS message to their parents and peers. The demo included observers from the Project Advisory Committee who took notes for evaluation. IES also developed an evaluation plan for the demo that gauged particular student interest areas and steer the content for the later workshops.

3. *Evaluate the demonstration*:
After the BCWS workshop demo, IES evaluated the results and observations collected during the presentation and drew measured conclusions about how successfully each project goal was achieved. The evaluation was deduced from adult observer responses and a student questionnaire.

4. *Develop plan for a full workshop program*:
IES will expand the BCWS Workshop Series beyond the demonstration into a three-workshop series. The evaluation of the Workshop Demo will be used to further develop a plan and curriculum for a workshop series that explores the risks of CECs in more depth and teaches students additional ways they can protect their water. This will include workshops that focus on BPA, CEC-free personal care products, and CEC-free snacks. The workshops will teach students how to make additional contaminant-free products that they can take home and demonstrate to friends and family, encouraging community-wide CEC behavior change. Students will also learn more about Colorado waterways and their importance, the hazards of CEC-containing products, and chemical footprint reduction methods. An objective of the program is to have 75% of students decrease their chemical footprint through workshop commitment goals. This will be measurable by survey results that will show students' change in knowledge and behavior regarding targeted contaminants.

5. *Create a replicable program*:
Combining the evaluation of the Workshop Demo and the resulting full Workshop Series, IES will create a "workshop-in-a-box" concept that can be replicated for student groups at other schools, disseminating the BCWS message throughout Colorado communities.

Program Overview

Planning: Collaboration with Mitchell Elementary staff and PTA

The Blue Crew Water Stewards Workshop Program Demo was built through a period of careful planning and collaboration both within the CEC Team and with Mitchell Elementary. After IES held a successful Tree Project event, Trees for Healthy Kids and Community, at Mitchell in 2011 the school was an ideal target for this program. Project planning began with collaborative meetings between IES staff members and Tracy Fletcher, a key contact from the previous Mitchell program and an active member of the Mitchell Elementary PTA. During our initial meeting, Tracy voiced the idea of conducting a demo to introduce the students to contaminants of emerging concern. Tracy's involvement with the school and its students was an important resource to the improvement of our program. Tracy was able to brief the Mitchell principal, Mrs. Samantha Hollman, on our project and what it could do for the science program at the school. Having a Tracy as a contact throughout the planning process was important to the success of the program.

Our initial meetings with Tracy Fletcher led to further meetings with the school staff and principal. During these meetings, we discussed program content and the aspects that the science department was looking for in an outside program. Mindy Laster, our 6th grade science teacher contact, helped by providing framework for the 6th grade science curriculum and suggesting the best ways to time the demo. A few IES team members were also able to observe Ms. Laster's science class, which aided the team in gaining an understanding of the classroom dynamic and the tools and technology available to IES already present in the classroom. For example, our team incorporated "thinking maps", a learning tool already familiar to the students, into the project demo. The principal, Tracy Fletcher, and Mindy Laster will remain important contacts for the workshop series this spring.

Supplies: Purchase and Timing

The CEC Team developed a master materials list while it was developing the demo curriculum. Small amounts of the necessary materials were purchased several weeks in advance to allow time to solve technical problems and carry out rehearsals of the demo. One technical problem we encountered was buying an aloe vera that did not have additives and would successfully mix with rubbing alcohol. We needed to ensure that our homemade hand sanitizer would be the right consistency and that the team could efficiently bottle our product. IES had to purchase the BPA-free bottles in advance to ensure they were the correct size and other precautionary reasons. IES submitted a materials budget to the Mitchell PTA but the PTA was unable to provide funding. The Mitchell PTA did, however, agree to donate materials from their homes or through individual purchases. These donations were greatly appreciated and helpful to the success of the program. Some of the items were only loaned and not available for future IES workshops. While all necessary items were available for the workshop demo, many of the items were collected only a few days before the event. If IES were to receive donations for future workshops, it would be advisable to organize and confirm the supplies at an earlier date to prevent any program shortcomings.

Program Content and Teaching Strategies

The workshop demo focused on four target contaminants of emerging concern: parabens, BPA, synthetic fragrance, and triclosan. We chose to introduce multiple CECs to give a broad lesson

on what CECs are and where you might find them. In the spring workshop series, IES will provide a more in depth analysis of one CEC in each workshop. This demo emphasized learning the basics about CECs and how to avoid releasing them into the environment, primarily by reading product labels. Students helped workshop providers in refreshing ideas about the wastewater cycle and water pollution. The CEC Team incorporated the important goal of putting water contamination in a local perspective by discussing the wastewater cycle in terms of Golden, CO and their local water source, Clear Creek. According to the North American Association for Environmental Education (NAAEE) project a local perspective on an environmental issue is paramount to engaging young students in environmental protection. We taught students that everyone contributes to water pollution. Discussing CECs was used as a bridge to get students interested in becoming stewards of the water.

The workshop demo was provided to three 6th grade science classes, which encompassed the entire Mitchell 6th grade class of approximately 67 students. Because the first two workshops were held during simultaneous classes, the trained IES staff was split into two team members presenting each of the first two workshops and then coming together to teach the third. IES Executive Director, Carol Lyons, and Institute Associate, Janice Ward, were also present as program aides and workshop observers.

Visual learning was a key aspect of the Blue Crew Water Stewards Workshop Demo. IES created three original posters for the workshop that displayed the local wastewater cycle, the target CECs we were discussing, and a poster stating some of the top ways for students to reduce their chemical footprint. IES a set of these three posters with Mindy Laster to hang up as a reminder of the lessons learned and to keep students excited about the spring workshop series. Our team created a PowerPoint for the introduction section of the workshop to introduce students to IES and contaminants of emerging concern. The PowerPoint did not appear to play a significant role in student acquisition of knowledge. Increased utilization of the SmartBoards available in each classroom would help make the PowerPoint more interactive and engaging.

Experiential learning was also an important aspect of this workshop demo. The CEC Team wanted to make the workshop demo as hands on and interactive as possible. Along with engaging students through questions, we involved the students in two project-specific hands on activities. First, we conducted an experiment with each class that we titled the "bucket concept." In this experiment, students applied a lotion containing the CEC, parabens, to their hands and then washed off their hands in a large bucket filled with tap water. This action resulted in cloudiness and the presence of oils and residue in the water. The bucket concept was used to demonstrate how easily CEC-containing products can enter our water and contaminate it with CECs. The students learned that, just because we use a product on our body, does not mean that it will stay there. It is, therefore, important to purchase or make products that do not contain target CECs, like parabens. When the students were asked to dump out the cloudy water, they were asked where that water was going. This emphasized the important workshop message that we affect the water of those living downstream from us by contaminating our water.

The most popular activity was making CEC-free hand sanitizer with the students. Volunteer students came to the front of the class to help mix alcohol, aloe vera juice, and essential oils for scent to make a homemade hand sanitizer that does not contain CECs. Each student was able to take home a personal bottle of the hand sanitizer and provided with a key ring to attach it to their

backpacks. This activity was a good way to show students how easy it is to make homemade personal care products that will not pollute the water. We also gave each student an official Blue Crew Water Stewards sticker to attach to their hand sanitizer or notebook that will act as a prompt to remind them about the lessons learned during the workshop demo.

Finally, IES reinforced the importance of reading product labels by passing out sample bottles of different products that either contained CECs or did not. Students took turns dictating which target contaminant they found on the product label and which type of product it was found in. Practicing label reading is essential to creating a new behavior in students as consumers. When shopping with parents or shopping independently as young adults, they will remember which contaminants to look out for and avoid purchasing those products. Because contaminants may appear under a variety of names, this activity helped students learn to identify CECs on a variety of products. IES sent each student home with an educational flier to share with their peers and parents. These fliers provided CEC-free product recipes and reminded students of some of the top easy ways to reduce their chemical footprint.

Working with Mitchell Elementary

After meeting with the Mitchell staff and principal, IES was informed that our curriculum best fit the learning level and science lesson plan of the 6th grade class. Our program provided a "real world application" to the 6th grade science curriculum, a curricular aspect that Jefferson County requires of all schools. IES strived to make this complex subject as age appropriate as possible through environmental education research and by running our curriculum and speaking notes through approved "reading level" technology. Throughout the workshop demo, the IES staff was thrilled by the adept knowledge of the 6th graders and their ability to answer almost any question in a thoughtful and creative manner. The students were cooperative and showed genuine interest in the program content.

Mitchell Elementary staff and PTA were also involved in the workshop demos. Mindy Laster gave sound advice on how to improve the curriculum and how to beset manage our limited time with each class. Two PTA members acted as program aides and observers, helping to maximize the benefit of our program evaluation. The classroom space and technology met the needs of the workshop demo and the positive learning environment set by the 6th grade science teachers greatly profited the program.

Program Research

The North American Association for Environmental Education (NAAEE) and the Colorado Alliance for Environmental Education (CAEE) acted and bases for our program design and curricular content. Their tested guideline provided standards that we used to make our workshop demo age appropriate and focused on the types of environmental education most effective for 6th grade students. The classroom observation carried out by IES staff also aided in preparing for the specific student group we were teaching.

The CEC Team developed post-workshop surveys for both adult and student attendees. These surveys were drawn from CAEE survey design and provided us with a rounded collection of opinions and suggestions that strengthened the evaluation of the workshop demo.

Evaluation

Student surveys were administered to all students on the Monday following the Demo. We chose to leave the surveys with the teachers to hand out on Monday to save time for our presentation and to see what students retained over the weekend. Adult volunteers and teachers were asked to complete an adult evaluation as well and return as soon as possible.

Student Evaluations

The student evaluations contained statements that the students were asked to rate by answering "strongly disagree," "disagree," "agree," or "strongly agree." A copy of the student evaluation can be found in Appendix X. These questions were targeted to determine if the workshop was interesting and increased their exposure to the CEC problem, to provide feedback on the content and presentation techniques, and to determine if students are willing to pass on their new knowledge to their family and peers.

The evaluations reveal that students overwhelmingly rated the statements with "agree" or "strongly agree". Statements 6 and 7, while still a majority of students answered "agree" or "strongly agree", saw the most responses with "disagree" or "strongly disagree". Those statements asked students to rate whether they would share their knowledge about CECs with someone at home and whether they will try to make CEC-free products at home. Encouraging students to change their behavior and share their knowledge with others will be a focus in the upcoming three-workshop series.

The open-ended questions were used to determine the students' favorite activity in the workshop, identify areas where the presentation could explain concepts better, and what students would like to learn about in the upcoming three workshop series. The students' favorite part of the workshop was creating the CEC-free hand sanitizer. Students also enjoyed passing around plants, discussing the water cycle, and participating in the bucket concept. About one third of the students indicated that there was nothing that could have been explained better. The rest of the students indicated that concepts such as how CECs harm water and the environment, the water cycle, and defining CECs could have been better explained. A full list of the responses can be found in Appendix XX. Students responded with varied answers for what they would enjoy seeing in future workshop topics. The topics that were repeated several times include making other CEC-free products, the water cycle and water treatment plants, CECs and the future effects on humans and the environment, and other ways to protect the environment.

Adult Evaluations

IES asked the teachers and parents who helped with the BCWS Demo to fill out an adult evaluation. A copy of the evaluation can be found in Appendix XX. The questions asked the adults to determine whether the content was age appropriate, assess whether the students understood the content, and whether the demo increased their own understanding of CECs. There were two open-ended questions to determine how the presentation can be improved and what was most beneficial to the presentation.

IES only received two of the four adult observer evaluations. The observers answered "strongly agree" on all ranking questions, with the exception of one "4". This is an area where we can improve on in the organization and student comprehension of the information. The open-ended

questions about areas to improve revealed that we should discuss that sometimes you can see pollution and sometimes you cannot with examples. Also, discuss why CECs are added to products and be specific about what chemical names to look for on the labels. An area to improve on is to practice the sections more so they flow better in the presentation. The observers revealed that students enjoyed volunteering for tasks and participating in the hands-on aspects of the presentation. The presentation also raised awareness about CECs in a responder's life, a key goal of the BCWS program.

Internal Goals Assessment

The BCWS Demo was a success by allowing IES to get into the classroom and excite the sixth graders about water stewardship. Each section of the presentation had a learning goal that guided that guided the development and direction of the presentation. The introduction goal was to introduce the concepts of water pollution, water sources, and CECs. The bucket concept was designed to show students how easily water pollution can occur. The goal of making the hand sanitizer was to show students that creating CEC-free products at home could be fun and easy. Lastly, the wrap-up section sought to ask students questions to determine what they learned in the Demo and to excite them for the three-workshop series in the spring.

The IES presenters were overwhelmed by the enthusiasm and eagerness of the sixth graders to participate. Nearly every hand was raised when a volunteer was needed to participate in the bucket concept or making the hand sanitizer. When questions were asked there were always multiple hands raised and the students had several different responses.

Recommendations and Next Steps

In-class obstacles

The most difficult part of the workshop demo was to make sure our presentation remained within the 40-minute class period. Timing is important to ensure that we spend enough time on the important concepts that students should take away. The second round of the presentation ran more smoothly and stayed within the time constraint.

We intended to use the smart board in the introduction section. There was a cause and effect diagram in the PowerPoint that allowed the students to interact with the presenters by identifying causes and effects of water pollution. During the simultaneous workshops, neither classroom's smart board was set up properly, causing a small distraction for the students and using some of our time. In future workshops, IES presenters should ensure all technology is working properly prior to the presentation. For future workshops, we should think of ways to more efficiently and effectively use the smart boards as they provide a unique way of interacting with the students.

Another area of the presentation that presented some obstacles was ensuring fluidity throughout the presentation. In the first simultaneous workshops, the wrap-up section was cut short due to the time constraints and spending too long in other sections. The flow of the presentation was improved during the third presentation, perhaps because we had already completed one presentation.

Areas to improve

An area to improve on is timing. With the demo workshop completed, we have a better idea about how much content we can fit into each section. Another area to improve on is practice the sections more to ensure a better flow throughout the presentation.

Based on the evaluations, some students stated that the concept of how CECs harm the water, environment, and humans could be explained better. More emphasis on long-term, small-dose exposure should be included in the explanation. The following workshop series should focus on one or two CECs rather than covering four. Many students seemed overwhelmed about the contaminants they were looking for while reading the labels.

For the workshop series and future demo workshops, a better way for collecting the adult evaluations should be developed. The student evaluations were administered and returned promptly. IES has only received two adult evaluations out of four adult observers. We sent several e-mail reminders and have yet to receive the last two evaluations. We should request that the evaluations be filled out and returned to and IES member immediately following the workshop and let them know how important these evaluations are to us.

Next steps

First, IES must develop the 3-workshop series curriculum. IES has the basic framework laid for the three workshops, but more detail needs to be incorporated. Each workshop should be divided into four sections and create an outline, identify the learning objectives, and create speaking notes for each section. The student evaluations revealed that students enjoyed the hands-on experiences and creating CEC-free products. The upcoming workshops should incorporate these aspects into the curriculum. Based on the student evaluations, students are interested in making other CEC-fee products, the water cycle and water treatment cycle, and CECs impacts on humans and the environment.

Another important area to focus on for the future is funding for the workshop series. IES should continue to apply for grants to fund the program. Another approach for program funding is to talk to local Golden businesses about providing support for the BCWS.

As a result of the demo workshop, a professor at the Colorado School of Mines and a teacher at South Lakewood Elementary School contacted IES about possible future collaboration. IES met with the professor and we are excited to begin collaboration with CSM. IES is interested in expanding the BCWS program through presentations at other elementary schools and through our workshop-in-a-box concept.

IES is excited about the success of the demo workshop and looking forward to the three-workshop series in the spring.

Appendices

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