Eight-Legged Educators: Exploiting the Enigmatic Nature of Arachnids

Evaluation Progress Report
Year 1 Fall 2012 to Spring 2013

Prepared:
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The contents of this report conform to our highest standards for data collection and reporting. If you should have any questions or concerns regarding the information reported within, please contact us

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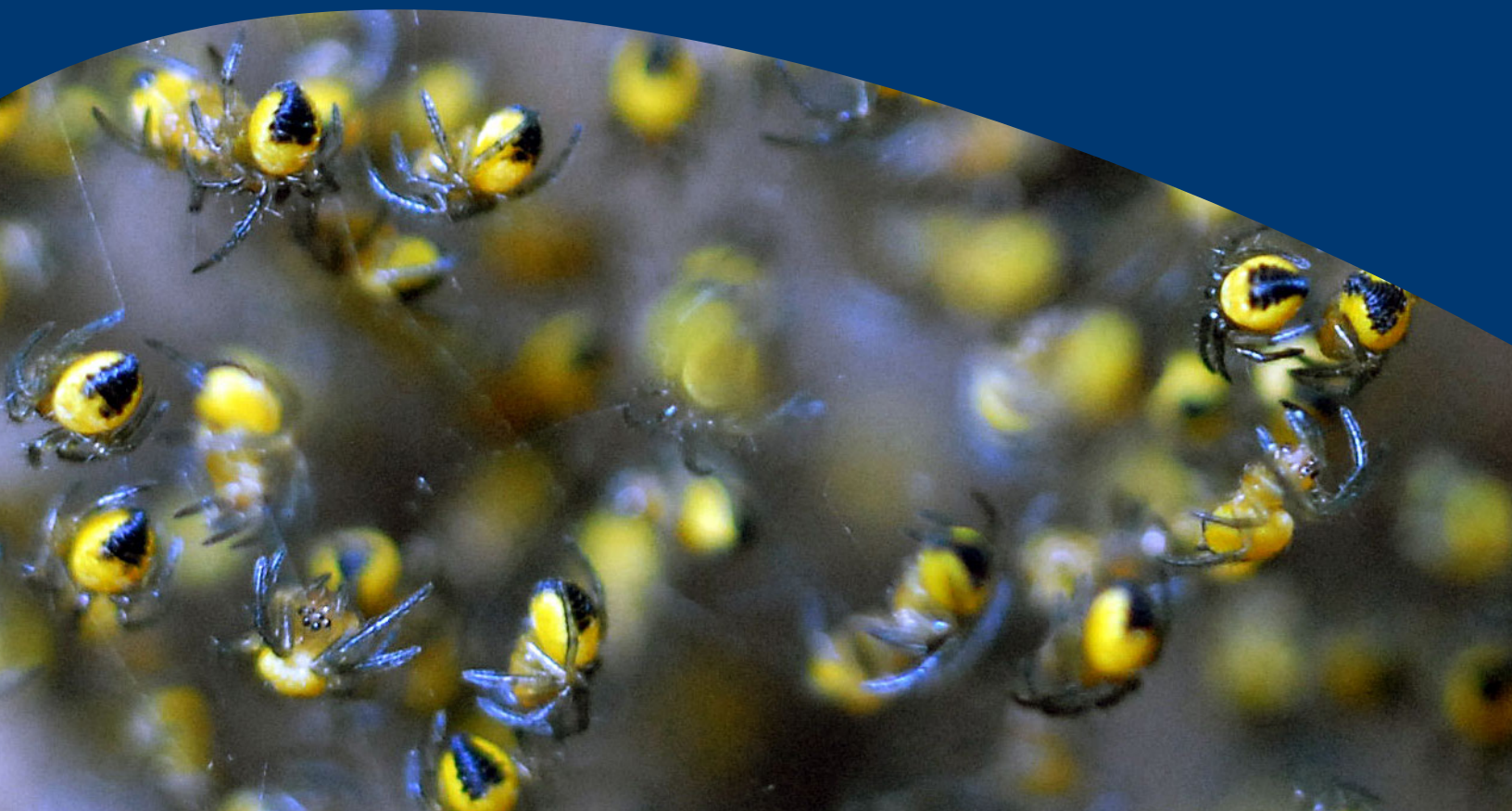

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Introduction

Program Description

Eight-Legged Educators: Exploiting the Enigmatic Nature of Arachnids, a project funded by the National Science Foundation, utilizes arachnids as a hook to draw public interest towards science. Three main programs within the project work to achieve this aim: (1) an event at a museum entitled Eight-Legged Encounters, (2) a university seminar class teaching biology students about science communication and outreach, and (3) an after school club for middle school aged youth, taught by the seminar students.

Purpose of Evaluation

The Eight-Legged Educators project includes an evaluation conducted by the Bureau of Sociological Research (BOSR). The purpose of the evaluation is to assess the strengths and weaknesses of the current program structures to allow for improvement over the course of the grant and to examine the impact of the project. The goals of this evaluation are to measure: (1) the impact of the Eight-Legged Encounters event on the general public's interest in science, (2) the impact of an after school science club on the youths' interest in, knowledge of, and future career aspirations related to science, (3) the university students' knowledge of and interest in science outreach, and (4) the effectiveness of the university seminar class in preparing students to do science outreach.

Methods

The data collection for the Eight-Legged Educators evaluation involved three audiences: a post-event survey completed by participants at the Eight-Legged Encounters event, a club experience survey completed by students in an after school club, and focus groups, observations, and end-of-course evaluations conducted with students in the BIOS 497/897 "Communicating Science Through Outreach" seminar class at the University of Nebraska-Lincoln (UNL). Data collection was conducted from February to April 2013. The following sections describe the details of those data collection pieces.

Eight-Legged Encounters Exit Survey

On February 17, 2013, BOSR staff administered post-event surveys at the Eight-Legged Encounters event, held at the Nebraska State Museum. This event was hosted by the program administrators, and included many activities about arachnids geared toward youth. Adult attendees leaving the event were asked if they would be willing to complete a short survey about their experiences at the event (Appendix A). Of the 846 adults and youth who attended the event, 101 adults completed the survey (non-respondents included those who refused and those who left while data collectors were busy with other respondents). BOSR staff used the survey to measure attendees' interest in the event activities and the impact of the event upon their interest in science more generally.

After School Science Club Survey

As part of the seminar class, UNL students lead after school science clubs with middle school students and were given latitude in choosing a theme and activities for their club. UNL students working in small groups of 2-3 individuals lead a total of five clubs. The UNL students were also learning the evaluation process within their seminar class, so to apply this learning, the UNL students worked together with BOSR staff to create a survey to use with their middle school students. All of the surveys contained a set of nine core questions created by BOSR. Additionally, UNL students created questions specific to different club activities, which resulted in customized surveys for each club (Appendix B). The surveys were administered by the UNL students during the week of April 15, within normal club time. All five after school science clubs were administered the survey. In total, 26 middle school participants completed the survey, which represented the majority of those participating in the after school science clubs.

Data Collection with Seminar Students

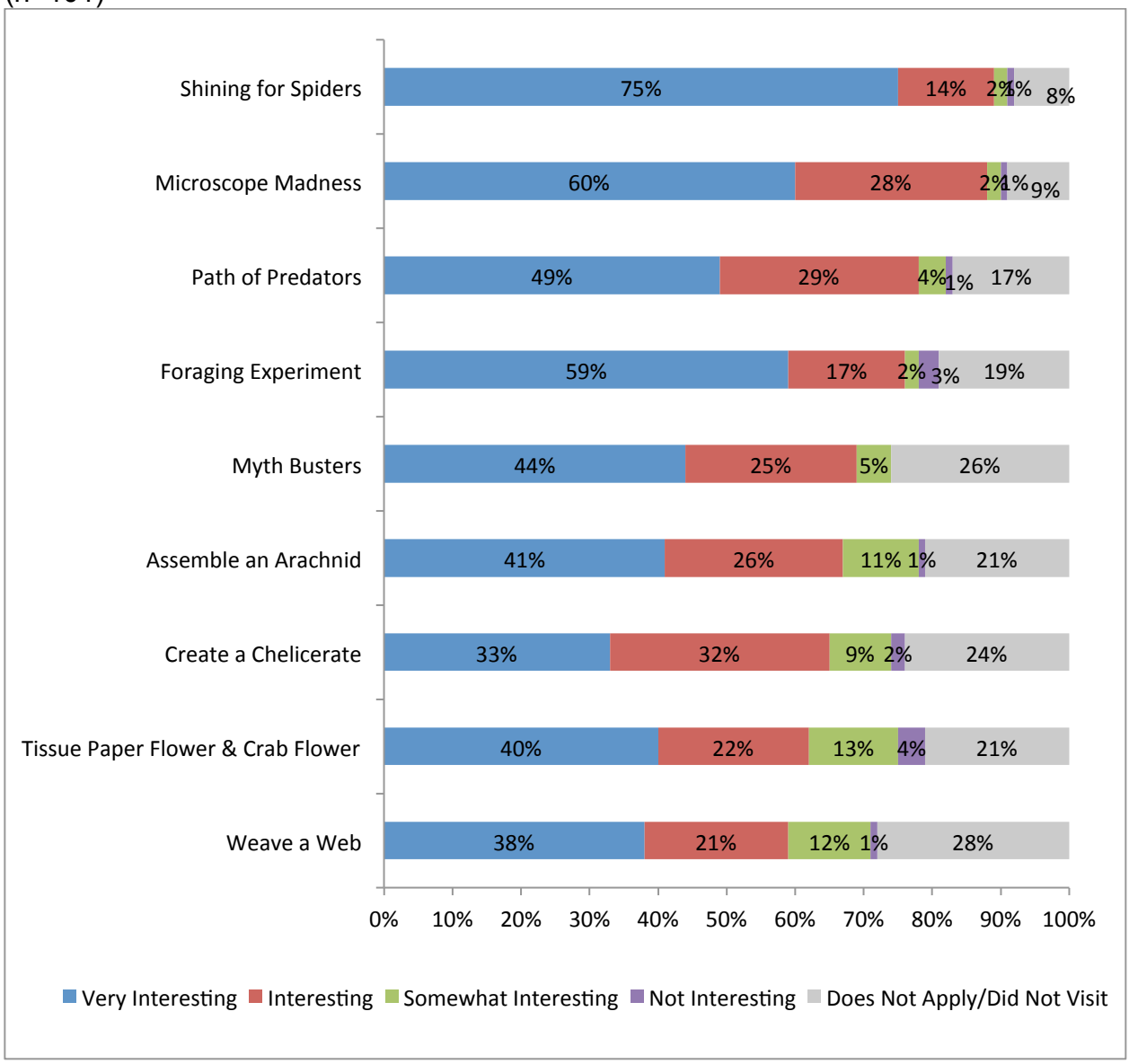
Thirteen upper level undergraduate students and graduate students participated in the BIOS 497/897 “Communicating Science Through Outreach” class during the spring of 2013. These students both helped collect evaluation data from the middle school students, and also provided evaluation data of their own through an in-class focus group, observed reflection presentations, and course evaluations. All data collection efforts occurred as part of normal class activities. On March 5, 2013 BOSR staff conducted a 45-minute focus group with the UNL students. The goal of the focus group was to explore the impact of the class on their future professional goals involving science outreach and to receive feedback about the course. The script for the focus group can be found in Appendix C. Later in the semester, on April 23 and 25, BOSR staff observed two classroom reflection periods in which each group presented on their experiences with the after school science club. Finally, course evaluations were administered on the final day of the semester (April 25). The course evaluations included both closed and open-ended questions.

Findings

Eight-Legged Encounters Event

From the exit survey of Eight-Legged Encounters attendees, the majority of attendees found each of the stations to be either interesting or very interesting (Figure 1). "Shining for Spiders" and "Microscope Madness" were reported as the most interesting stations, which were reported as interesting or very interesting by 89% and 88% of respondents, respectively. Those two stations were also most likely to be attended according to self-reported visits, with only 8-9% not visiting those stations. While over half of all respondents reported **all** stations as either interesting or very interesting, "Weave a Web" was considered the least interesting (59%), and was the least attended.

Figure 1: Proportion of exit survey respondents reporting each station as interesting. (n=101)



The Eight-Legged Encounters event was intended to both educate the public about science and to foster an interest in the general community about science. Most attendees agreed that they (and their families) learned a lot about science at the event, with 62% reporting agreement and 36% reporting strong agreement with that statement (the remaining 2% disagreed). When asked about their interest (and their family's interest) in learning more about science after attending the event, 65% reported that they were very interested and 31% were interested (the remaining 4% expressed that they were somewhat interested). There was a significant relationship between the measures, with attendees who reported learning a lot being more likely to report that they were interested in learning more after the event ($p<.001$), suggesting educating the public about science results in interest to learn more.

The survey also provided an opportunity for attendees to offer an open ended response about what they liked about the event. On the whole, the responses were very positive (for a full list of responses, see Appendix D.) The open-ended responses were aggregated to identify common themes. One of the common themes that emerged was an appreciation of the interactive nature of the event, as expressed by an attendee, *"Interactive got to hold a tarantula! Love the dancing spider room & black light."* The focus on interaction created an environment that was accessible to everyone, including youth, families, and adults. This sentiment was specified by several participants:

> *"Everything! Such fun for kids of all ages. I'm 60+ & didn't know there were 350,000 kinds of [beetles]-wow! I can still learn & this was entertaining [as] well as educational! Nice job all around! I needed the magnifying help. Thanks."*
>
> *"I love how it drew so many families, and it [was] informative in an [accessible] way."*

Many participants also expressed being impressed with the availability of live animals within the exhibit. One participant reported what they enjoyed most as, "*Live exhibits, giant tarantula, hands on."* Finally, another recurring theme was that the event was very engaging for youth and that it was successful in teaching scientific concepts, including the scientific method. Participants reported this in the following statements:

> *"It captivated my 4 yr, 6, 9, 10, and 13 year olds imagination*."
>
> *"The hands on [activities] that actually taught the scientific process--the foraging experiment downstairs was fantastic! And all the volunteers were so enthusiastic. Well done!"*

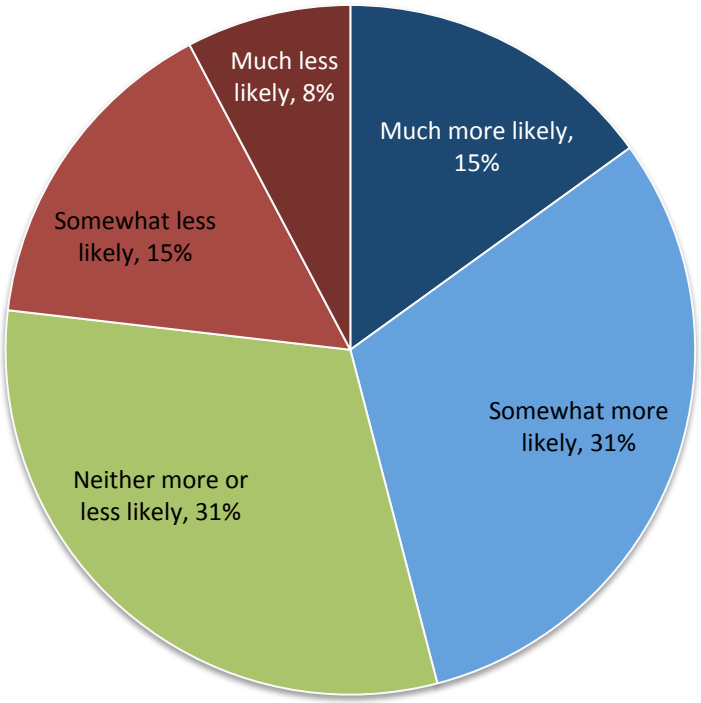
After School Science Clubs

The results from the core questions that were included on all after school science club evaluation surveys is reported here, while detailed frequency tables for both the core and the club specific questions can be found in Appendix E. Overall, the after school club participants reported that they enjoyed the club and that it increased their knowledge and interest in science. All of the 26 middle school student respondents

reported that they had at least some fun participating in the club, with 65% reporting some fun and 35% reporting a lot of fun. Furthermore, nearly all reported learning something during the club, with half (50%) learning some and 46% learning a lot, while one respondent (4%) reported that they did not learn at all.

Figure 2 shows how likely or unlikely participants are to want a future job in science after participating in the club. Nearly half reported an increase in their desire to pursue a job in science, with 31% being somewhat more likely and 15% being much more likely to pursue a future job in science. In contrast, participation in the club resulted in some participants identifying that science is not something they want to pursue, with 15% reporting that they are now somewhat less likely and 8% much less likely to want a future job in science. While almost one-third (31%) reported no impact of the club on their future career plans.

Figure 2. Likeliness of club attendees to want a future job in science after having participated in the after school club. (n=26)



The students were also asked about their knowledge of what scientists do. Over half of middle school participants agreed (23%) or strongly agreed (35%) that they had more of an understanding of the job of a scientist after participating in the club, while only 8% disagreed (the remaining 35% neither agreed nor disagreed).

Figure 3 shows that there was a greater impact in the increase of general knowledge of science, with the vast majority of students reporting that their understanding of science increased some (35%) or a lot (46%), while only one participant (4%) reported that they did not learn at all.

Figure 3. Change in interest after attending the after school club. (n=26)

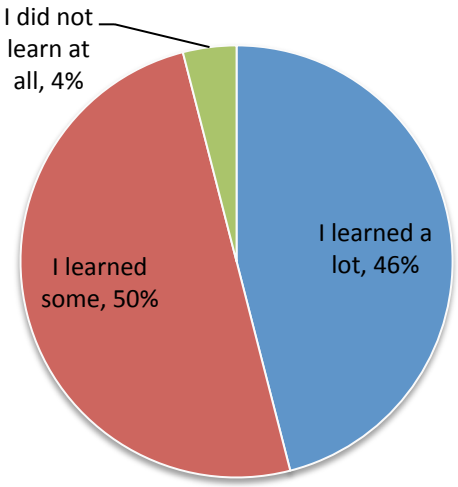
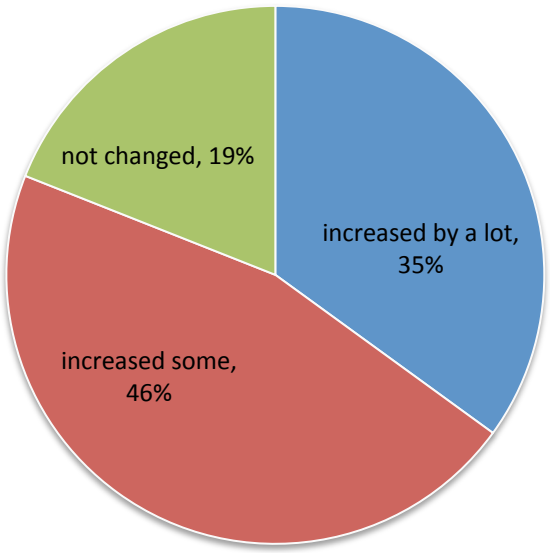


Figure 4 shows more variation in reports of changes to interest in science. The majority of students reported that their interest in science increased over the duration of the club, with 46% reporting that their interest increased some and 35% that it increased a lot. The remaining 19% reported no change.

Figure 4. Change in knowledge of after attending the after school club. (n=26)



Middle school participants were asked to report they liked most about the club. Their open-ended responses were coded and four main themes emerged (the full list of responses can be found in Appendix E). Participants primarily enjoyed 1) doing experiments, 2) learning about bugs, 3) playing games, and 4) learning about animals.

The students were also asked to describe something new that they learned in the club. They were asked to either write down or draw a picture in their description. Most often, students referenced behavioral aspects learned about spiders, bugs, and animals. The full list of written answers and drawings can be found in Appendix E, but a few examples are provided below.

> *"Mice with covers spend longer to eat, mice with no cover don't eat as much, mice with fleas are not good at foraging."*
>
> *"Some Scorpions shoot vinegar."*

When asked about their future interest in participating in a science-themed club, the participants' responses varied, but were skewed toward a desire to participate again. About one-third of the middle school students reported that they probably (23%) or definitely (8%) would *not* participate again, while half (50%) responded that they probably would and 15% that they definitely would participate again.

Science Communication Seminar

Focus Group

The first piece of data collected with the university seminar students was a focus group, completed midway through the semester. The students were asked about their experiences with the after school clubs, the impact of practicing science outreach on their long term professional goals, and the course as a whole.

When discussing how their outreach experiences impacted their views on science, the seminar students expressed an impact on their broader understanding of science, more so than gains in specific scientific concepts. As one seminar student stated, *"[the outreach experience] didn't affect my deep knowledge, but I did have to learn about lesson plans, and interesting factoids."* The age of the target audience forced the seminar students to simplify the material and make it engaging to maintain interest among the middle school students, which helped some seminar students reflect on what is well known about science. One student mentioned that it made them think about *"what is obvious in science and what is not obvious in science, especially when you've been working in the field for a really long time."* Another mentioned a need to change the organizational structure of their existing scientific knowledge: *"the kids learn with groups, and not orders like I am used to".*

As it related to the after school club participants' learning, the seminar students saw many changes already occurring in their clubs. One student said that each week their club was *"growing, and definitely not shrinking"* indicating that interest was spreading outside the initial group of kids who were attending. Another said the *"kids were starting to understand the concepts of costs and benefits of certain groups in biological systems…starting to understand why that's important and it's how biology really works."* In another club, a student reported that the change in interest and learning was very variable: *"some were really growing, and some of our students don't really seem to be changing at all."*

When asked about the impact of the science clubs on their future career goals, most felt that they wouldn't be pursuing careers teaching middle school students. One seminar student described that before teaching the club, teaching middle school wasn't a specific career goal, but it had not been removed from consideration; however, after the clubs, it was clear that it wasn't a path to pursue. This student specified, *"I don't want to be a middle school science teacher fulltime. It's so much work."* Another student added that simplifying the material for the younger audience was not desirable, *"the part of biology that I do that's really cool is too complicated for younger students to understand."*

However, a couple students felt teaching science to the middle school audience may still be a possible future career. One student explained the enjoyment found in working with the middle school audience,

> *"[I] really liked the middle school experience. There's pay off; I'll never be able to explain like the RNA sequence…there are things that are so much cooler than what you're doing…but looking at how the only kids who are going to join our club…it's such an important time to show kids this stuff and give them enough interest to get over the hump of eighth grade."*

One student spoke about the challenges faced in trying to teach middle school students, *"it was about trying to get them to not say 'eww.'"* Later this same seminar student said that overall, teaching at the middle school was a lot of fun and that teaching middle

school in the future would be a consideration. Moreover, it was added that participating in the outreach experience had a positive impact, *"it made me feel more strongly that way."*

The students also provided feedback on what they thought would have been helpful to learn before starting to teach the clubs. Several students suggested that behavioral management training would have been helpful before teaching the clubs. *"Having an idea what level to teach too"* was another piece of information that would have been helpful for the seminar students.

Overall, the seminar students felt like the class was helpful, but they had some suggestions for improving the class in the future. Several expressed that taking the class was a big undertaking and that more should not be added. As one participant noted, *"it wasn't too big, but I definitely would not add anything else."* One student suggested they do outreach within a high school setting, because the students would be more advanced and potentially more interested. It was also suggested to modify from an after-school setting to an in-school setting. Some felt it would be beneficial to gain the in-school experience where the mindset of the middle school students is different in the school setting, and that they would appreciate assistance from a teacher. Seminar students also suggested teaching fewer clubs. *"I think we should cut the club number down a bit, so we'd have more students with each group."* Improvements in communications with school leaders of the clubs would also ease planning efforts in the future. Within the course specifically, one seminar student mentioned that there "*needed to be a stronger link between the guest speakers and the content of the class."* They understood why some people came to teach, however it would have been helpful for that link to be established more directly. Lastly, there was uncertainty with grading policies expressed by multiple students, which may be expected given the nature of a newly designed course: *"there was a lot of uncertainty with the class changing often. I wasn't sure what we were being assessed on."*

Looking at the most impactful aspects of the seminar course as a whole, students most often reported that their favorite aspects of the course were time spent in the after-school club and at the Eight-Legged Encounters event. They appreciated reaching a broader audience, as one student specified, *"[Eight-Legged Encounters event] was really really fast paced and at the end of the day it was amazing to think we'd reached so many people."*

End of Class Reflections

During the final two class periods, the seminar students presented in groups about their club experiences. The students provided example activities that were completed by the clubs and provided insights from their experiences. Overall, the students reported positive experiences with their clubs. A common theme from the presentations was the effectiveness of outside activities to keep the middle school students interested and engaged. One group described examining flowers and digging for arthropods. Another group reported that *"we tried to go outside as much as possible"* as they found it lead to

fun and productive club sessions, and others wished they had had more outdoor activities *"as [the students] were always talking about them."*

Another common theme was the importance of structure to the activities. One group reported, *"We tried having some exploratory time, but the kids weren't interested."* Goal sheets were used in one club as a behavioral management system that helped add structure to the club. *"The students identified what they wanted to work on and could refer back to that sheet during club time."* A different group discussed the structure of bringing specimens to the club. *"When we would bring specimens at first, we would bring 3, 4, 5 at a time but then go 2 or 3 weeks without them. But then the kids would be asking if we were having a specimen."* The middle school students expressed disappointment when there wasn't a specimen each week, so a modification may be to spread them out across weeks and center the activities on that specimen.

The groups also reported learning about internal management techniques as they were working as a group to lead the club. One group discussed how they initially were trying to all communicate and work together to manage activity creation and planning, but their solution ultimately was designating a leader who was responsible to communicate with everyone to ensure that what needed to happen was happening. One group reported feeling like they were fully incorporated into the organization of the other clubs at the school, while others had issues with communication at their school sites that they had to navigate and learn from.

End-of-Course Evaluations

During the last day of the course, seminar students completed a standard evaluation form, created by the department. Overall, students reported satisfaction with the course, specifically with the knowledge and enthusiasm of the instructors. However, in meeting the course goals, the response was somewhat mixed. Four students felt the purpose of the course was fully accomplished and another 4 felt it was met a great extent, while 3 students felt that it was not completely accomplished. The focus groups identified the fairly heavy workload associated with the class, which also emerged from the course evaluations; however, the students also expressed gaining a lot in the process. Eight students reported that they are getting a lot out of the course, but that they have to work hard.

Students' perceptions of the instructors were overwhelmingly positive. When asked about how the instructor's oral presentations and explanations were helpful in understanding the subject matter, 10 of 11 students felt they were almost always or often helpful. And students reported high marks for being provided an opportunity to ask questions, with 10 reporting this as almost always happening and 1 reporting it often. All students completing evaluations provided high ratings of teacher effectiveness, with 8 reporting it as excellent and 3 as good. The open-ended responses mimicked the same themes. One student said *"this class was awesome,"* while another commented *"fantastic experience."* A third student echoed *"very good instructor and a fun enjoyable class."*

In addition to the positive experience with the instructor of the class, the students reported enjoyment and learning from the after school club portion of the class. One student expressed: *"The main activity, designing and running the clubs, is the most outstandingly good feature of the course."* Another reported: *"I love that this course allows us to run our own after school programs and go into the schools."* In addition to their enjoyment of the club portion of the club, multiple students wrote that they appreciated learning about different types of science outreach, and that the course had a *"very practical, career-oriented attitude."* The course prepared students for future outreach, as one student described their personal outcomes from the course as: *"I am much more familiar with many types of outreach and how to go about planning for activities and presentations."*

While the students reported many positive aspects of the class on their evaluations, there were other areas that had less positive agreement. The organization of the class was the focus of much of this disagreement, which also emerged in the focus groups as an area for improvement. For example, while 7 students (64%), reported that the class material was almost always or often presented in a well-organized manner, the other 4 (36%) reported that only sometimes was this the case. This same idea was repeated in one student's comment: *"Since this was the first time having this course there was confusion at times. The class needs to be better organized. Students should be told when things are due and given advice on running their programs."*

A second aspect of the course that students felt needed improvement was the grading scheme. When asked about the grading policies in the course, 6 students reported that they were excellent, while the remaining were less enthusiastic and reported that it was good (n=3) or satisfactory (n=2). Responses about whether students were accurately informed of their standing throughout the course were also variable, with 2 students reporting this was the case almost always, 4 often, 3 sometimes, and 1 seldom. This sentiment was shared with a comment stating that the class *"need[s] much cleared grading policies."* This echoes the suggestion offered in the focus group for improved clarity in the grading scheme.

Finally, the evaluations suggested the course text and/or assigned readings were not especially effective learning aids. One student felt the reading materials were often effective, and an additional 4 felt the materials were sometimes effective. In contrast, 3 felt they were seldom and 2 that they were hardly ever effective learning aids. This same sentiment was found in the open-ended comments. One student reported, *"I enjoyed everything minus the reading. It might have been because I already had prior instruction in this area, but I didn't get anything out of it."* A second student also offered, *"the required texts seemed to be not useful, not helpful and a waste of $115."*

Conclusions

While the evaluation relies on small populations and therefore is limited in scope and generalizability, the initial evaluation data suggests that the Eight-Legged Educators

program is succeeding overall. Self-reported exit surveys show that the Eight-Legged Encounters event increased both the public's knowledge of science and its interest in the subject. Participants of the event appreciated the interactive nature of the event and felt that it was engaging and taught scientific concepts.

The after school science club also prompted an increase in participating middle school students' interest and knowledge of science according to self-reported measures. Participants enjoyed the club, especially doing hands-on activities and learning about bugs and animals, and nearly half reported an increase in their likelihood of pursuing a science career. The seminar students perceived that there was variability in interest and learning, but that many of the participating middle school students showed understanding of scientific concepts. The seminar students also reported that they personally learned a lot about how to conduct science outreach, both specifically with the middle school population, and by learning more general skills that would translate to other situations. They reported overall satisfaction with the course and an appreciation for the outreach experiences.

Although the program has been shown to have many successes so far, there remains room for improvement, particularly in the next iteration of the university seminar class. Based on feedback from the students, it is recommended that the classroom instructors create a more explicit link between the guest speakers, the class readings, and the science communication topics. Additionally, setting a syllabus with clearly delineated grading expectations would reduce much of the uncertainty expressed by the students. Lastly, the total number of clubs led by the seminar student could be decreased to increase the number of students leading each club. As the Eight-Legged Educators program moves into its second year, incorporating these changes would help lead to an even more successful second year of programming.

Appendices

Appendix A: Eight-Legged Encounters Survey

Eight-Legged Encounters Experience Survey

We would like to learn about your experiences at this event today. All of your responses are anonymous.

1. How interesting did you (and your family) find the following stations:

	Very Interesting	Interesting	Somewhat Interesting	Not Interesting	Does Not Apply/Did Not Visit
a. Myth Busters	○	○	○	○	○
b. Path of Predators	○	○	○	○	○
c. Assemble an Arachnid	○	○	○	○	○
d. Create a Chelicerate	○	○	○	○	○
e. Tissue Paper Flower & Crab Spider	○	○	○	○	○
f. Weave a Web	○	○	○	○	○
g. Microscope Madness	○	○	○	○	○
h. Shining for Spiders	○	○	○	○	○
i. Foraging Experiment	○	○	○	○	○

2. How did you learn about the event?

- ○ Newspaper
- ○ Radio
- ○ School
- ○ Museum Website
- ○ Friends of the Museum
- ○ Facebook
- ○ UNL email
- ○ TV
- ○ Attended other *Sunday with a Scientist*
- ○ Other: _____

○ Did not know it was going on

3. In what city and state do you live?

_____

4. How interested are you (and your family) in learning more about science after this event?

- ○ Very Interested
- ○ Interested
- ○ Somewhat Interested
- ○ Not at all Interested

5. (My family) and I learned a lot about science at this event.

- ○ Strongly Agree
- ○ Agree
- ○ Disagree
- ○ Strongly Disagree

6. Please list suggestions for additional topics that may be of interest to you.

_____

7. What did you like about this event?

_____

Thank you for your time!

Appendix B: After School Science Club Surveys

Side 1 (same for all club surveys)

After School Science Club Experience Survey

Please answer the following questions about your experience in this club. There are no right or wrong answers. We just want to hear what you think about the club. Thank you!

1. How much fun did you have learning about science in this club?
   - ○ I did not have fun at all
   - ○ I did not have much fun
   - ○ I had some fun
   - ○ I had a lot of fun

2. How much did you learn about science in this club?
   - ○ I learned a lot
   - ○ I learned some
   - ○ I did not learn much
   - ○ I did not learn at all

3. Now that you have participated in this club, are you more or less likely to want a future job in science?
   - ○ Much more likely
   - ○ Somewhat more likely
   - ○ Neither more or less likely
   - ○ Somewhat less likely
   - ○ Much less likely

4. Since I began participation in this club, my interest in science has...
   - ○ increased by a lot.
   - ○ increased some.
   - ○ not changed.
   - ○ decreased some.
   - ○ decreased by a lot.

5. How much do you agree or disagree with this statement: Now that I have participated in this club, I know more about what scientists do.
   - ○ Strongly Agree
   - ○ Agree
   - ○ Neither agree nor disagree
   - ○ Disagree
   - ○ Strongly disagree

6. Since I began participation in this club, my understanding of science has...
   - ○ increased by a lot.
   - ○ increased some.
   - ○ not changed.
   - ○ decreased some.
   - ○ decreased by a lot.

7. If another science after-school club were offered, would you participate in that program?
   - ○ I definitely would not
   - ○ I probably would not
   - ○ I probably would
   - ○ I definitely would

8. What did you like most about participating in this club?

Side 2- Group 1:

9. Describe something new that you learned in this club. You may use words or draw a picture to describe what you learned.

10. How many people did you share what you did or learned in club each week, on average?
    - ○ 0
    - ○ 1-3
    - ○ 4-6
    - ○ 7+

11. If you did tell people about what you did or learned in club, who was it? *Select all that apply.*
    - ○ Parents/Guardians
    - ○ Siblings
    - ○ Friends
    - ○ Teachers
    - ○ Other
    - ○ Nobody

12. Why did you decide to attend the club in the first place?

13. What were your favorite types of activities you experienced at the club? *Select all that apply.*
    - ○ Games we did in the hallway
    - ○ Games we did in the classroom
    - ○ Games we did outside
    - ○ Watching video clips
    - ○ Looking at pictures
    - ○ Discussing topics with us (Ben, Ashley, and Angelica)
    - ○ Other:
    - ○ None

14. What other topic(s) would you like to learn about in the future from an after schools science club? *Select all that apply.*
    - ○ Genetics
    - ○ How the Body Works
    - ○ Prehistoric Life
    - ○ Evolution
    - ○ Disease/Germs
    - ○ Animal Diversity
    - ○ Food Webs
    - ○ Plants
    - ○ Habitats of the World
    - ○ Other:
    - ○ None

Side 2- Group 2:

9. Describe something new that you learned in this club. You may use words or draw a picture to describe what you learned.

10. What words would you use to describe this club to others? *Select all that apply.*

- ○ Cool
- ○ Fun
- ○ Boring
- ○ Interesting
- ○ Gross
- ○ Other:

11. What was your favorite activity during the club?

12. Since I began participation in this club, my understanding of microbes has…

- ○ increased by a lot
- ○ increased some
- ○ not changed
- ○ decreased some
- ○ decreased by a lot

13. Which activity do you feel you learned the most from?

Side 2- Group 3:

9. Describe something new that you learned in this club. You may use words or draw a picture to describe what you learned.

10. In your opinion, how could this club be improved?

11. Which activity was your least favorite and why?

- ◯ Animal Pictionary
- ◯ Autograph Game
- ◯ Phylogame
- ◯ Food Web
- ◯ Carnivory – Bat and Moth
- ◯ Omnivory – Design a mouth
- ◯ Herbivory – Hunter/Gatherer
- ◯ Create own spider web
- ◯ Build an Animal
- ◯ Build-an-Arachnid
- ◯ Live Animal Interactions
- ◯ Arachno-motion
- ◯ Live Animal Interactions with Dino Cam
- ◯ Arachn-is or Arachn-isn't?
- ◯ Schizomids & Leaf Litter
- ◯ Path of Predators Booklet

12. Which activity was your favorite and why?

- ◯ Animal Pictionary
- ◯ Autograph Game
- ◯ Phylogame
- ◯ Food Web
- ◯ Carnivory – Bat and Moth
- ◯ Omnivory – Design a mouth
- ◯ Herbivory – Hunter/Gatherer
- ◯ Create own spider web
- ◯ Build an Animal
- ◯ Build-an-Arachnid
- ◯ Live Animal Interactions
- ◯ Arachno-motion
- ◯ Live Animal Interactions with Dino Cam
- ◯ Arachn-is or Arachn-isn't?
- ◯ Schizomids & Leaf Litter
- ◯ Path of Predators Booklet

13. If you could add an activity what would it be?

Side 2- Group 4:

9. Describe something new that you learned in this club. You may use words or draw a picture to describe what you learned.

10. Which in-class activity was your favorite?

Why?

11. Which in-class activity was your least favorite?

Why?

12. How often did you talk with your friends about this club?
- ○ Often
- ○ Sometimes
- ○ Once
- ○ Never

13. How often did you talk with your family about this club?
- ○ Often
- ○ Sometimes
- ○ Once
- ○ Never

14. How often did you talk with your teachers about this club?
- ○ Often
- ○ Sometimes
- ○ Once
- ○ Never

15. How much do you agree or disagree with this statement: This club has made me think more positively about bugs.
- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

Side 2- Group 5:

9. Describe something new that you learned in this club. You may use words or draw a picture to describe what you learned.

10. How much do you agree or disagree with this statement: Performing experiments with live spiders made me appreciate them more.
    - ○ Strongly agree
    - ○ Agree
    - ○ Neither agree nor disagree
    - ○ Disagree
    - ○ Strongly disagree

11. What did you learn from performing the foraging experiment?

12. My favorite topic we covered was:
    - ○ The history of life on Earth
    - ○ Climate change
    - ○ Spider behavior
    - ○ Fire ecology
    - ○ Changing seasons
    - ○ Other:

13. My favorite activity type was:
    - ○ The games
    - ○ The experiment
    - ○ Guided exploration (bird feathers and fossil examinations)
    - ○ Demonstrations (pine cone and arthropod demos)
    - ○ Other:

14. What would you recommend we change or add for future clubs of this nature?

15. Which of the following interested you in joining the club? (select all that apply)
    - ○ Live animal demonstrations
    - ○ Experiments with spiders
    - ○ General interest in biology
    - ○ The possibility of a field trip
    - ○ Other:

Appendix C: Seminar focus group script

Student Focus Group Questions

Introduction

Good afternoon and welcome to our session. Thank you for taking the time to join our discussion of Communicating Science through Outreach. My name is Mindy and I am the Core Facility Manager of the Survey, Statistics and Psychometric Core Facility, who was asked by Dr. Hebets and Dr. Diamond to conduct this sessions. Assisting me with some note-taking is Joan, a Bureau of Sociological Research employee.

You were asked participate because you have been participating in the Communicating Science through Outreach course. The purpose of the focus group is to gather information to better understand how well the Communicating Science through Outreach course is going. Information will be used to determine how the course can be improved in the future.

Today we will be discussing your experiences and your opinions about the course. There are no right or wrong answers but rather differing points of view. Please feel free to share your point of view even if it differs from what others have said.

Before we begin, let me share some ground rules. This is both an evaluation project and a learning research project, and your participation does not help or harm your relationship with the university or your professors. Please speak up – only one person should talk at a time. We're recording the session because we don't want to miss any of your comments. If several are talking at the same time, the tape will get garbled and we'll miss your comments. We will be on a first name basis today, and in our later reports no names will be attached to comments. You may be assured of complete confidentiality as much as we possibly can. Obviously some of you are familiar with each other, but I would ask that out of respect for each that we keep the comments made here within these walls.

Our session will only last about forty five minutes. Let's begin.

Questions

1. What do you like best about the course?
2. What do you like least and what could be improved?
3. How do you feel this class has increased your knowledge of science communication?
4. How do you feel this class has increased your knowledge of evaluation practices?
5. What is working well with your after school clubs so far?
6. What challenges have you confronted with your after school clubs?
7. How have you been able to address those challenges?
8. Do you have any suggestions for the remainder of the semester?

Appendix D: Eight-Legged Encounters Frequency Tables

How interesting did you find: Myth Busters

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	43	42.6	44.3	44.3
	Interesting	24	23.8	24.7	69.1
	Somewhat Interesting	5	5.0	5.2	74.2
	Does Not Apply/Did Not Visit	25	24.8	25.8	100.0
	Total	97	96.0	100.0	
Missing	System	4	4.0		
Total		101	100.0		

How interesting did you find: Path of Predators

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	48	47.5	49.0	49.0
	Interesting	28	27.7	28.6	77.6
	Somewhat Interesting	4	4.0	4.1	81.6
	Not Interesting	1	1.0	1.0	82.7
	Does Not Apply/Did Not Visit	17	16.8	17.3	100.0
	Total	98	97.0	100.0	
Missing	System	3	3.0		
Total		101	100.0		

How interesting did you find: Assemble an Arachnid

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	40	39.6	41.2	41.2
	Interesting	25	24.8	25.8	67.0
	Somewhat Interesting	11	10.9	11.3	78.4
	Not Interesting	1	1.0	1.0	79.4
	Does Not Apply/Did Not Visit	20	19.8	20.6	100.0
	Total	97	96.0	100.0	
Missing	System	4	4.0		
Total		101	100.0		

How interesting did you find: Create a Chelicerate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	31	30.7	33.3	33.3
	Interesting	30	29.7	32.3	65.6
	Somewhat Interesting	8	7.9	8.6	74.2
	Not Interesting	2	2.0	2.2	76.3
	Does Not Apply/Did Not Visit	22	21.8	23.7	100.0
	Total	93	92.1	100.0	
Missing	System	8	7.9		
Total		101	100.0		

How interesting did you find: Tissue Paper Flower & Crab Spider

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	38	37.6	40.0	40.0
	Interesting	21	20.8	22.1	62.1
	Somewhat Interesting	12	11.9	12.6	74.7
	Not Interesting	4	4.0	4.2	78.9
	Does Not Apply/Did Not Visit	20	19.8	21.1	100.0
	Total	95	94.1	100.0	
Missing	System	6	5.9		
Total		101	100.0		

How interesting did you find: Weave a Web

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	37	36.6	38.1	38.1
	Interesting	20	19.8	20.6	58.8
	Somewhat Interesting	12	11.9	12.4	71.1
	Not Interesting	1	1.0	1.0	72.2
	Does Not Apply/Did Not Visit	27	26.7	27.8	100.0
	Total	97	96.0	100.0	
Missing	System	4	4.0		
Total		101	100.0		

How interesting did you find: Microscope Madness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	59	58.4	60.2	60.2
	Interesting	27	26.7	27.6	87.8
	Somewhat Interesting	2	2.0	2.0	89.8
	Not Interesting	1	1.0	1.0	90.8
	Does Not Apply/Did Not Visit	9	8.9	9.2	100.0
	Total	98	97.0	100.0	
Missing	System	3	3.0		
Total		101	100.0		

How interesting did you find: Shining for Spiders

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	75	74.3	75.0	75.0
	Interesting	14	13.9	14.0	89.0
	Somewhat Interesting	2	2.0	2.0	91.0
	Not Interesting	1	1.0	1.0	92.0
	Does Not Apply/Did Not Visit	8	7.9	8.0	100.0
	Total	100	99.0	100.0	
Missing	System	1	1.0		
Total		101	100.0		

How interesting did you find: Foraging Experiment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interesting	56	55.4	58.9	58.9
	Interesting	16	15.8	16.8	75.8
	Somewhat Interesting	2	2.0	2.1	77.9
	Not Interesting	3	3.0	3.2	81.1
	Does Not Apply/Did Not Visit	18	17.8	18.9	100.0
	Total	95	94.1	100.0	
Missing	System	6	5.9		
Total		101	100.0		

How interested are you (and your family) in learning more about science after this event?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Interested	66	65.3	65.3	65.3
	Interested	31	30.7	30.7	96.0
	Somewhat Interested	4	4.0	4.0	100.0
	Total	101	100.0	100.0	

(My family) and I learned a lot about science at this event

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	35	34.7	35.7	35.7
	Agree	61	60.4	62.2	98.0
	Disagree	2	2.0	2.0	100.0
	Total	98	97.0	100.0	
Missing	System	3	3.0		
Total		101	100.0		

What did you like about this event?
1) Microscope 2) Pseudo scorpion, Disco
A lot of hands on
All
All of the information
All the crafts!
All the events
assemble an arachnid
Children friendly learning
Community
Dance party!
Diversity of activities
Everything
Everything Thanks
Everything-the interaction mostly
Everything!
Everything! Such fun for kids of all ages. I'm 60+ & didn't know there were 350,000 kinds of bettles-wow! I can still learn & this was entertaining was well as educational! Nice job all around! I needed the magnifying help. Thanks.
Extraordinarily well done!
family event
Fun for all ages! Lots of events, lots of live cirtters
Fun for kids.
Getting spider stamps!
Getting up close & personal with scary spiders!
Good interaction for attendees.
great exhibits
had different events for all ages
Hands on, good opps for gross body movement, easy enough for 5 yr old!
hands-on activities.
I didn't realize there were so many 8 (eight) legged
I liked the microscopes.
I love how it drew so many families, and it ws informative in an accessable way.
Interaction between the presenters/workers and the children
Interactive
Interactive got to hold a tarantula! Love the dancing spider room & black light
Interactive w/ kids
Interactive. I smell like vinegar! Spider. Cantelope.
It captivated my 4 yr, 6, 9, 10, and 13 year olds imagination.
It was all great! Love it here
it was very kid friendly & informative. Loved learning about all the speicies.

Just about everything.
Kids/family focus
Learning about the different spiders & arachnids
Level of interest for 5-6 yr. olds.
Live animals
Live exhibits, giant tarantula, hands on
Live spiders and other things
Live spiders.
Lots of education, interesting
Lots of great info-directions @ stations were clear.
Lots of hands on things for kids
Loved the hands on experience!
Making crafts
many hands-on activities.
Microscopes! (Looking at their faces) Glowing scorpions
More about local bugs
More comfort w/ spiders. Fun, Friends. Hard to know name of activites describe to help.
N/A
range of exposure to different animals
Really like the hands-on displays. Thanks!
Science presented at each station. that UNL students are heavily involved. Hands on. Shining for spiders was fun.
Seeing live spiders
Seeing the live spiders
Shining for spiders!
Son loves spiders. He wouldn't miss it
Spiders
Spread out events for more space--but alls worked good for this. Good to keep to one or two floors & make it clean.
the bugs
The diversity of booths
The easy access & the assitance offered.
The hands on activites that actually taught the scientific process--the foraging experiment downstairs was fantastic! And all the volunteers were so enthusiastic. Well done!
the hands on activities were great
The hands on stuff. And informative presenters.
The kids enjoyed it very much.
The number of displays, and the information presented
The setting.

The spiders were cool & so many other types of Arachnids.
The staff is awesome. So friendly-so interesting.
The wonderful ceatures and the interesting information
This is very knowledgeable
Thorough display of insects & their habitat
Trading cards, stamps, temp tattoos, interaction w/ scientists
Trading Cards!
Very good, hope to have longer visit.
Very hands on-welcoming-takes fear out of insects/arachnids.
Very informative, very helpful with science fair project
Very interactive even for older kids
Very interesting and fun!
Very kid friendly
Very nice

Appendix E: After school science club Frequency Tables

How much fun did you have learning about science in this club?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I had some fun	9	34.6	34.6	34.6
	I had a lot of fun	17	65.4	65.4	100.0
	Total	26	100.0	100.0	

How much did you learn about science in this club?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I learned a lot	12	46.2	46.2	46.2
	I learned some	13	50.0	50.0	96.2
	I did not learn at all	1	3.8	3.8	100.0
	Total	26	100.0	100.0	

Now that you have participated in this club, are you more or less likely to want a future job in science?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Much more likely	4	15.4	15.4	15.4
	Somewhat more likely	8	30.8	30.8	46.2
	Neither more or less likely	8	30.8	30.8	76.9
	Somewhat less likely	4	15.4	15.4	92.3
	Much less likely	2	7.7	7.7	100.0
	Total	26	100.0	100.0	

Since I began participation in this club, my interest in science has...

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	increased by a lot.	9	34.6	34.6	34.6
	increased some.	12	46.2	46.2	80.8
	not changed.	5	19.2	19.2	100.0
	Total	26	100.0	100.0	

How much do you agree or disagree with this statement: Now that I have participated in this club, I know more about what scientists do.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	9	34.6	34.6	34.6
	Agree	6	23.1	23.1	57.7
	Neither agree nor disagree	9	34.6	34.6	92.3
	Strongly disagree	2	7.7	7.7	100.0
	Total	26	100.0	100.0	

Since I began participation in this club, my understanding of science has...

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	increased by a lot.	12	46.2	46.2	46.2
	increased some.	9	34.6	34.6	80.8
	not changed.	5	19.2	19.2	100.0
	Total	26	100.0	100.0	

If another science after school club were offered, would you participate in that program?

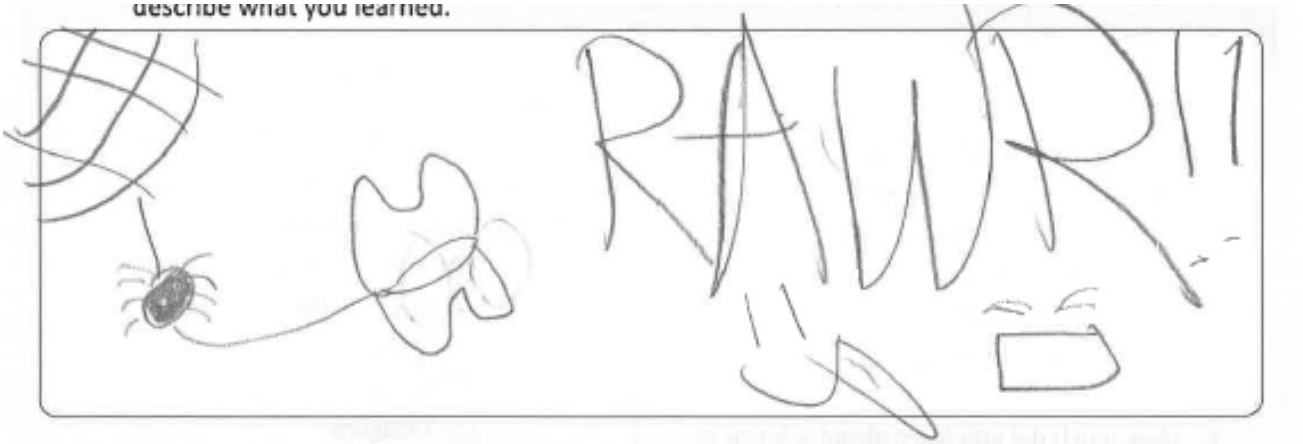
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I definitely would not	2	7.7	8.0	8.0
	I probably would not	6	23.1	24.0	32.0
	I probably would	13	50.0	52.0	84.0
	I definitely would	4	15.4	16.0	100.0
	Total	25	96.2	100.0	
Missing	System	1	3.8		
Total		26	100.0		

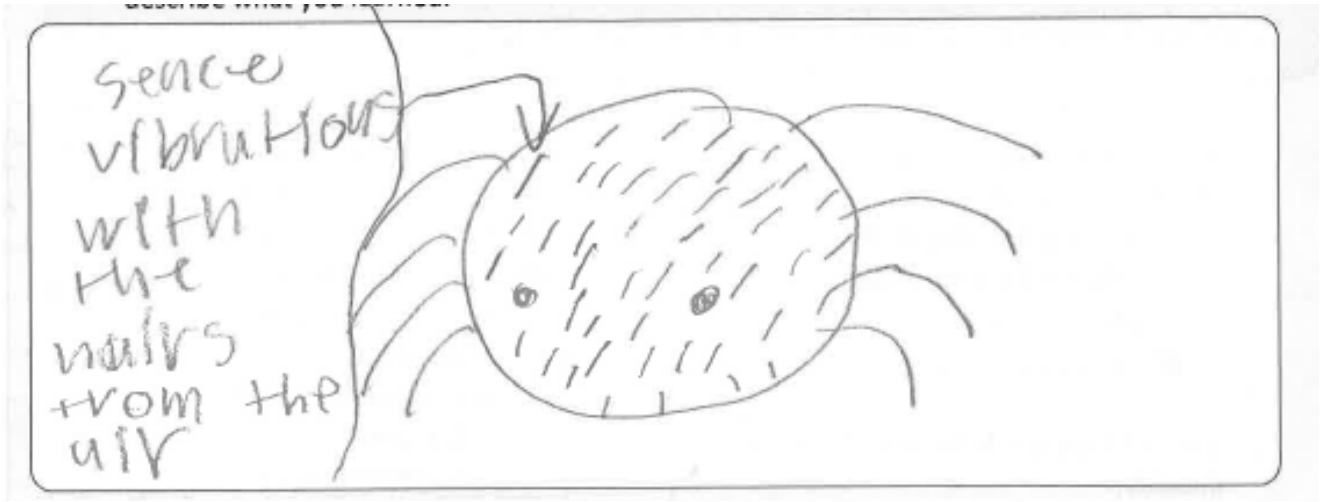
What did you like most about participating in this club?
ALL OF THE ANIMAL HABIT RELATED GAMES
ANIMALS (NOT BUGS)
BUGS AND STUFF
CELLS
DOING EXPERIMENTS
EXPERIMENTS
EXPIREMTS & TAKE STUFF HOM
FUN GAMES
GAMES WE DID AND ACTIVAL
GETTING AN OPPERTUNITY OF HAVING A MILLEPEDE OR COCKROACH
HANSCON AND A NEW HAT OF SLIME
HOW A CHEMICALS WORK
I LIKE THE DNA
I LIKED DOING THE EXPERIMENTS
I LIKED THE PART WHEN WE LEARNED MORE THINGS ABOUT ANIMALS.
LEARNING ABOUT NEW BUGS
LOOKING AT DIFFERENT BUGS I DON'T KNOW ABOUT
MAKING GOO
MILLIPEED GIVEAWAY
PLAYING GAMES AND LEARNING ABOUT ANIMALS

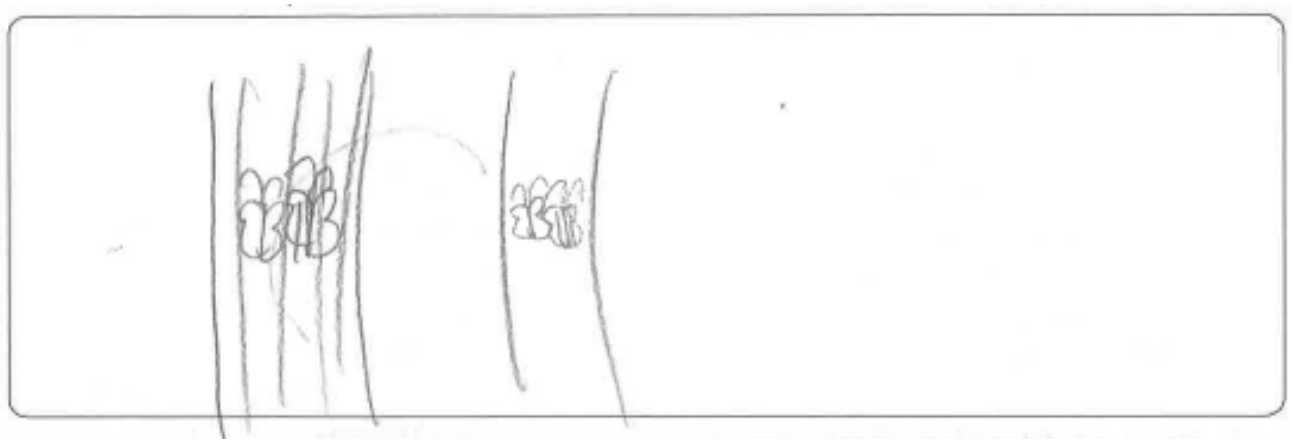
STRETCHY THING
THE GAMES AND LEARNING ABOUT ANIMALS
THE THINGS THAT I LIKED MOST ABOUT THIS CLUB IS WHEN WE LEARNED ABOUT THE WOLF SPIDER
WATCHING THE BUGS
WE GOT FREE BUGS AND CANDY AND FUN STUFF

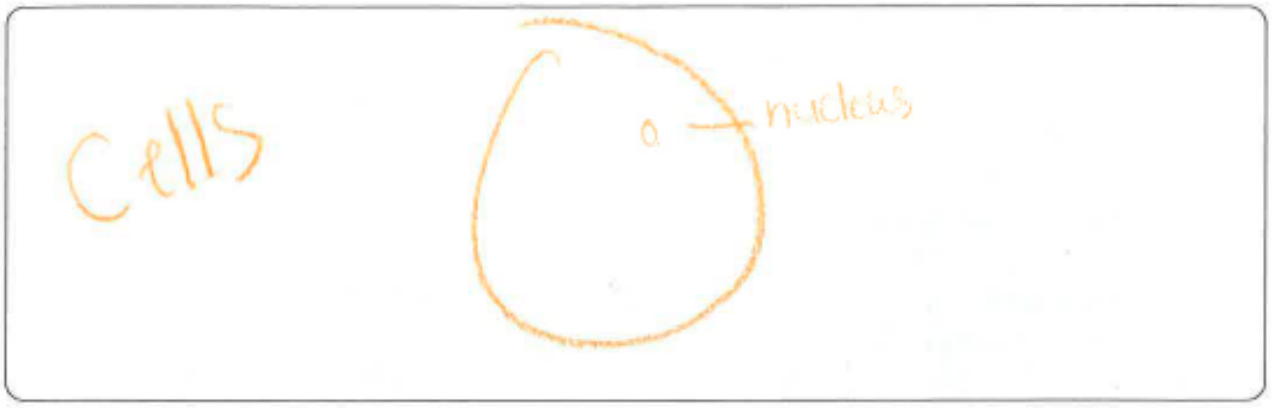
Describe something new that you learned in this club.
2H2O2->2H2O+O2
ARACHNS HAVE 2 BODY PARTS
CELLS AND NUCLEUS
GLUE
I LEARNED ABOUT HOW TICKS INFEST MICE AND CRIPPLE THEIR FORAGING SKILLS
I LEARNED ABOUT LIGHTNING BUGS AND HOW THEY USE THERE GLOWING
I LEARNED ABOUT SPIDERS AND OTHER BUGS AND HAD FUN DOING IT
I LEARNED SOMETHINGS ABOUT ANAMALS I NEVER KNEW ABOUT.
I LEAVE AFTER 20 MINS SO DONT LEARN MUCH
MICE WITH COVERS SPEND LONGER TO EAT,MICE WITH NO COVER DON'T EAT AS MUCH, MICE WITH FLEAS ARE NOT GOOD AT FORAGING
RAWR
SENCE VIBRATIONS WITH THE HAIRS FROM THE AIR
SOME SCORPIONS SHOOT VINEGAR
SPIDER FIGHTS
SPIDERS EYES GLOW/SPARKLE
THAT IF YOU PUT PEROXIDE ON A BANANA IT DISSOLVES SLOWLY
THAT YOU CAN SEE YOUR DNA

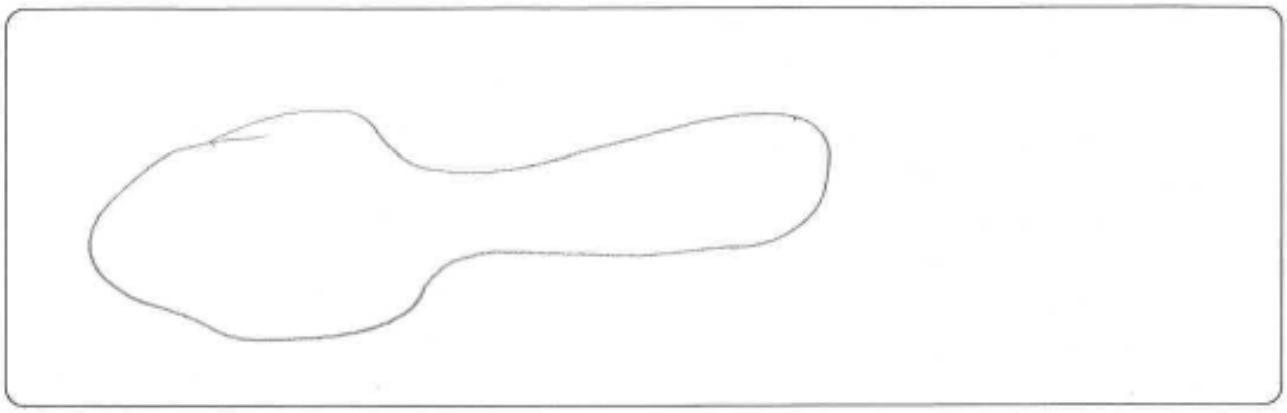
Picture Responses to: Describe something new that you learned in this club.

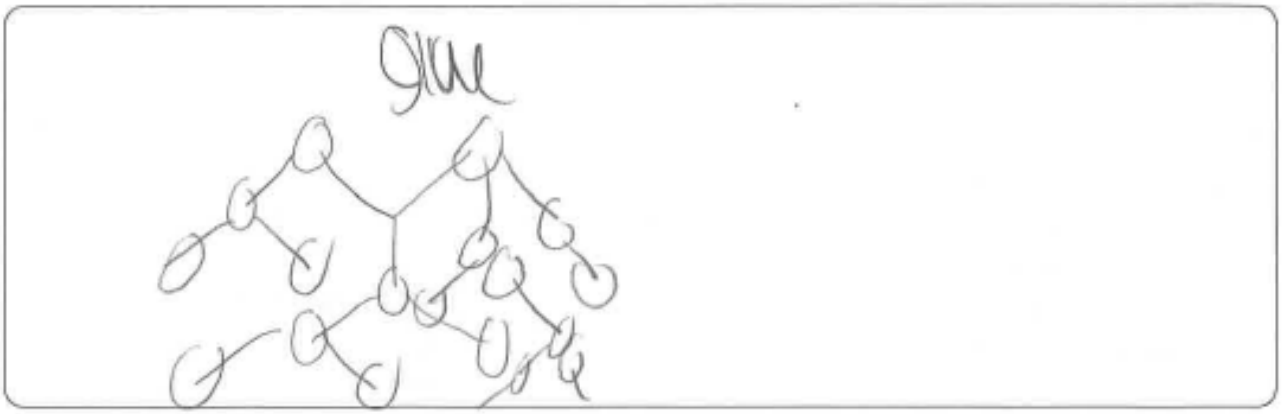


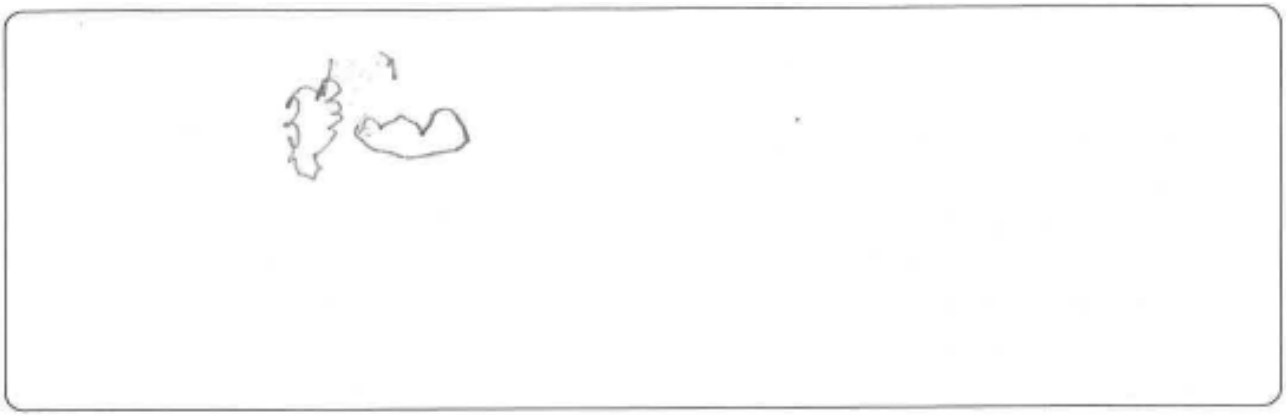





Cells
nucleus

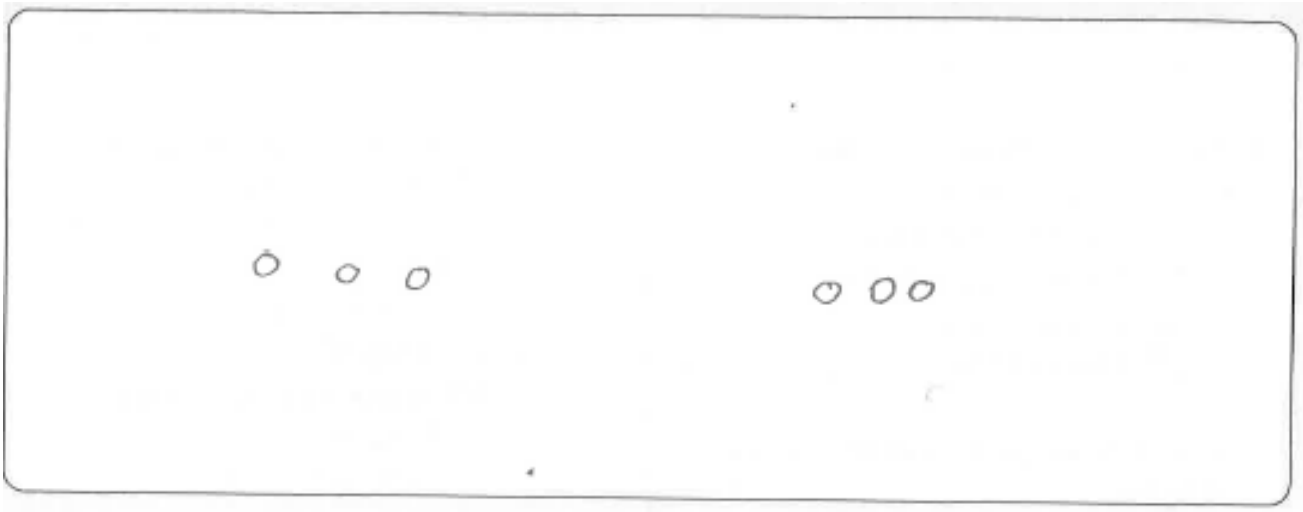


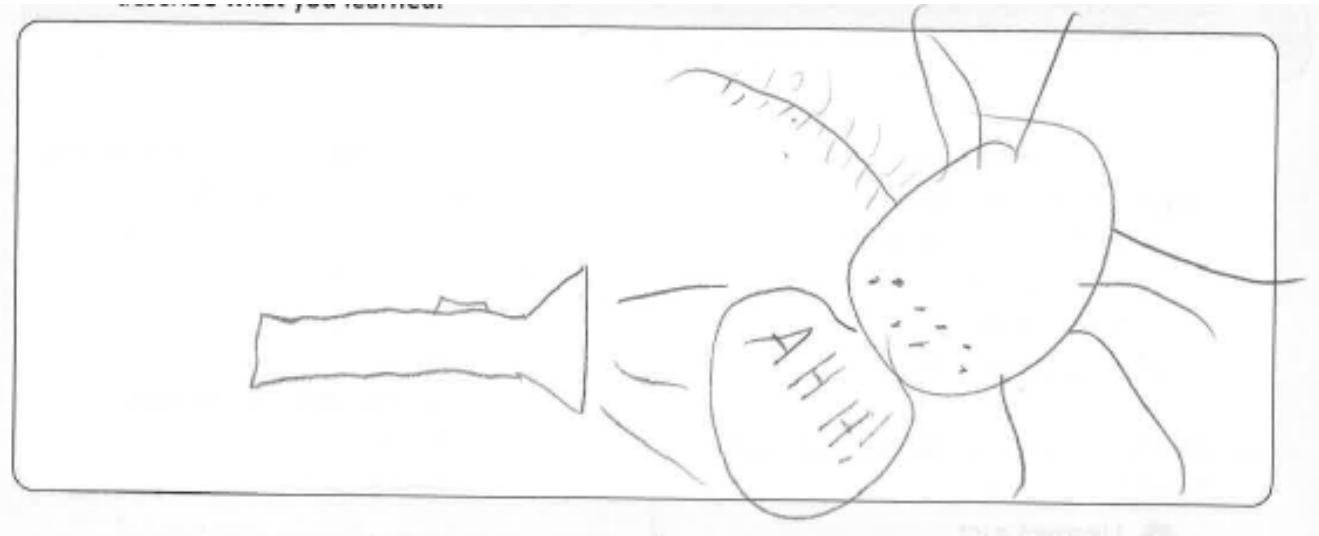

glue

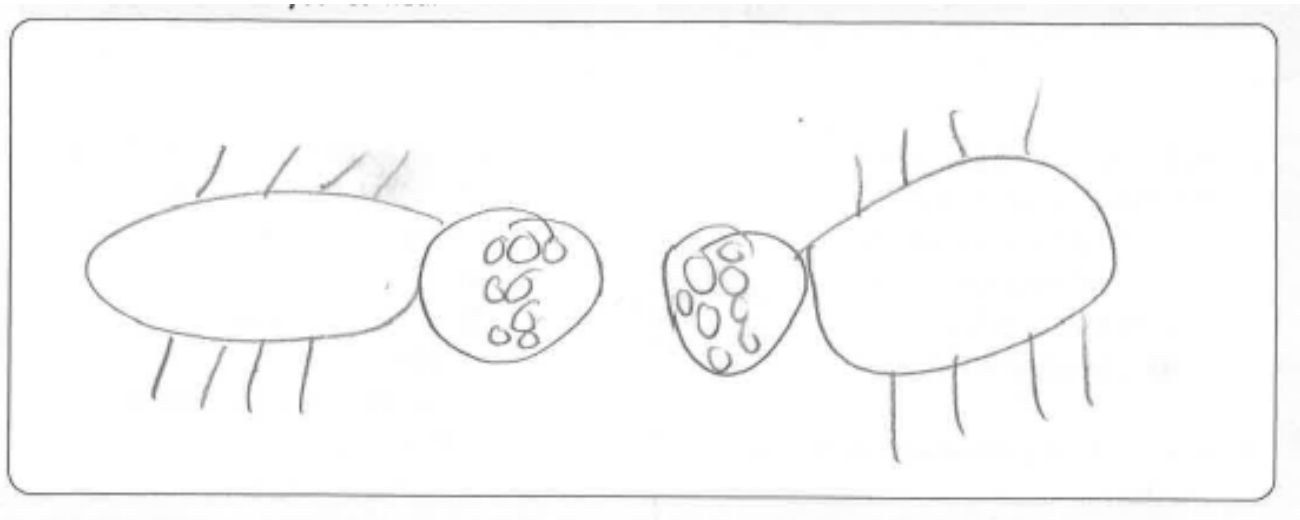



spiders eyes
glow \ sparkle


spider fights




AHH!



Group 1 additional data:

Group 1- What words would you use to describe this club to others?

Word	Times Selected
Cool	2
Fun	3
Boring	0
Interesting	3
Gross	0
Other	3

Group 1- What words would you use to describe this club to others: Other- specify
ALRIGHT
OK
THIS CLUB IS AWESOME

Group 1- What was your favorite activity during club?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		17	65.4	65.4	65.4
	ALL	1	3.8	3.8	69.2
	FINDING OUR DNA	1	3.8	3.8	73.1
	MAKING GOO	1	3.8	3.8	76.9
	MAKING SLIME	1	3.8	3.8	80.8
	SLIME TYPE THING	1	3.8	3.8	84.6
	THE DNA	1	3.8	3.8	88.5
	THE SLIMEY SUBSTANCE WITH THE GLUE	1	3.8	3.8	92.3
	The virus game	1	3.8	3.8	96.2
	WHEN WE MADE THE PUTTY STUFF	1	3.8	3.8	100.0
	Total	26	100.0	100.0	

Group 1-Since I began participating in club, my understanding of microbes has...

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	increased by a lot	1	3.8	11.1	11.1
	increased some	1	3.8	11.1	22.2
	not changed	7	26.9	77.8	100.0
	Total	9	34.6	100.0	
Missing	System	17	65.4		
Total		26	100.0		

Group 1- Which activity do you feel you learned the most from?
2H2O2->2H2O+O2
EXPIRMENTS
FINDING DNA
MAKING GOO
NONE
SLIME
THE GLUE MITED CHERADEHO
VIRUS

Group 2 additional data:

Group 2- How many people did you share what you did or learned in club each week, on average?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	3.8	20.0	20.0
	1-3	3	11.5	60.0	80.0
	4-6	1	3.8	20.0	100.0
	Total	5	19.2	100.0	
Missing	System	21	80.8		
Total		26	100.0		

Group 2- If you did tell people about what you did or learned in club, who was it:

Person/people	Times Selected
Parents/guardians	4
Siblings	1
Friends	4
Teachers	1
Other	1
Nobody	0

Group 2- Why did you decide to attend the club in the first place?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		21	80.8	80.8	80.8
	BECAUSE I AM VERY INTERESTED IN ANIMAL SCIENCES	1	3.8	3.8	84.6
	I LIKE ANIMALS	1	3.8	3.8	88.5
	I LIKE TO LEARN ABOUT ANIMALS	1	3.8	3.8	92.3
	I LOVE ANIMALS	1	3.8	3.8	96.2
	SOUNDED FUN	1	3.8	3.8	100.0
	Total	26	100.0	100.0	

Group 2- What were you favorite types of activities you experienced at club:

Type	Times Selected
Games we did in the hallway	5
Games we did in the classroom	5
Games we did outside	5
Watching video clips	4
Looking at pictures	4
Discussing topics with us	5
Other	0
None	0

Group 2- What other topic(s) would you like to learn about in the future from an after school science club:

Topic	Times Selected
Genetics	3
How the body works	2
Prehistoric life	4
Evolution	2
Disease/Germs	3
Animal Diversity	5
Food Webs	3
Plants	3
Habitats of the world	4
Other	0

Group 3 additional data:

Group 3- In your opinion, how could this club be improved?
BY BRINGING MORE ANAMALS.
DO NOT HAVE A WAY

Group 3- Which activity was your least favorite activity and why?	
Activity	Why?
Animal Pictionary	I hate to draw
Build an Animal	I do not like build an anamal becose I'm not good at making anamals.

Group 3- Which activity was your favorite activity and why?	
Activity	Why?
Schizomids & Leaf Litter	I like the leaf litter becose we got to go outside and exspore.
Live Animal Interactions with Dino Cam	It was cool.

Group 3- If you could add an activity what would it be?
Bring more anamals
Go outside more

Group 4 additional data:

Group 4- Which in-class activity was your favorite activity and why?	
Activity	Why?
Bug catching	IDK [I don't know]
Raceing	Because gobi won
Skorpion vs spider	It was awesome
Spider fight	Because it was fun to watch
Spider fights	Because I don't like spiders
Spider races	Fun to see who would win

Group 4- Which in-class activity was your least favorite and why?	
Activity	Why?
Waiting for bugs	Because it was boring
None	Because they are awesome
None	None
None	Because they were all fun
None	X

Group 4- How often did you talk with your friends about this club?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Often	2	7.7	28.6	28.6
	Sometimes	2	7.7	28.6	57.1
	Once	2	7.7	28.6	85.7
	Never	1	3.8	14.3	100.0
	Total	7	26.9	100.0	
Missing	System	19	73.1		
Total		26	100.0		

Group 4- How often did you talk with your family about this club?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Often	3	11.5	42.9	42.9
	Sometimes	1	3.8	14.3	57.1
	Once	2	7.7	28.6	85.7
	Never	1	3.8	14.3	100.0
	Total	7	26.9	100.0	
Missing	System	19	73.1		
Total		26	100.0		

Group 4- How often did you talk with your teachers about this club?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes	3	11.5	42.9	42.9
	Never	4	15.4	57.1	100.0
	Total	7	26.9	100.0	
Missing	System	19	73.1		
Total		26	100.0		

Group 4- How much do you agree or disagree with this statement: This club has made me think more positively about bugs.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	15.4	57.1	57.1
	Agree	2	7.7	28.6	85.7
	Neither agree nor disagree	1	3.8	14.3	100.0
	Total	7	26.9	100.0	
Missing	System	19	73.1		
Total		26	100.0		

Group 5 additional data:

Group 5- How much do you agree or disagree with this statement: Performing experiments with live spiders make me appreciate them more.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	3.8	100.0	100.0
Missing	System	25	96.2		
Total		26	100.0		

Group 5- What did you learn from performing the foraging experiment?
Not here
That granet was harder for the spider to get its pray and the paper is a lot easier.

Group 5- My favorite topic we covered was:	
Topic	Times Selected
The history of life on Earth	0
Climate change	0
Spider behavior	1
Fire ecology	0
Changing seasons	0
Other	1

Group 5- My favorite topic we covered was: Other- specify
Everything!

Group 5- My favorite activity type was:	
Type	Times Selected
The games	2
The experiment	0
Guided exploration (bird feathers and fossil examinations)	0
Demonstrations (pine cone and arthropod demos)	0
Other	0

Group 5- What would you recommend we change or add for future clubs of this nature?
More spider days
Start the spider mating experiment immediately and not talking so much

Group 5- Which of the following interested you in joining the club:	
Topic	Times Selected
Live animal demonstrations	1
Experiments with spiders	2
General interest in biology	1
The possibility of a field trip	2
Other	0

Appendix F: Seminar End-of-Course Evaluation Data

The instructor presented course material in a well-organized manner.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost always	2	18.2	18.2	18.2
	often	5	45.5	45.5	63.6
	sometimes	4	36.4	36.4	100.0
	Total	11	100.0	100.0	

The instructor's oral presentations and explanations were helpful in understanding the subject matter.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost always	4	36.4	36.4	36.4
	often	6	54.5	54.5	90.9
	sometimes	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

During lectures, opportunity was given for questions and comments by students.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost always	10	90.9	90.9	90.9
	often	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

The instructor stimulated your intellectual curiosity.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very much	2	18.2	18.2	18.2
	somewhat	9	81.8	81.8	100.0
	Total	11	100.0	100.0	

The instructor was willing to give individual aid.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost always	7	63.6	70.0	70.0
	often	3	27.3	30.0	100.0
	Total	10	90.9	100.0	
Missing	System	1	9.1		
Total		11	100.0		

The instructor was able to sense when the students didn't understand.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost always	5	45.5	45.5	45.5
	often	6	54.5	54.5	100.0
	Total	11	100.0	100.0	

The instructor's knowledge of the subject appeared to be

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	excellent	8	72.7	72.7	72.7
	good	3	27.3	27.3	100.0
	Total	11	100.0	100.0	

The examination questions gave you a fair chance to demonstrate your knowledge of the subject matter.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost always	1	9.1	50.0	50.0
	often	1	9.1	50.0	100.0
	Total	2	18.2	100.0	
Missing	System	9	81.8		
Total		11	100.0		

Grading policies were

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	excellent	6	54.5	54.5	54.5
	good	3	27.3	27.3	81.8
	satisfactory	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

The student was accurately informed of his/her standing throughout the course.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost always	2	18.2	20.0	20.0
	often	4	36.4	40.0	60.0
	sometimes	3	27.3	30.0	90.0
	seldom	1	9.1	10.0	100.0
	Total	10	90.9	100.0	
Missing	System	1	9.1		
Total		11	100.0		

The text and/or assigned reading have been effective learning aids to you.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	often	1	9.1	10.0	10.0
	sometimes	4	36.4	40.0	50.0
	seldom	3	27.3	30.0	80.0
	hardly ever	2	18.2	20.0	100.0
	Total	10	90.9	100.0	
Missing	System	1	9.1		
Total		11	100.0		

The purpose of this course (as stated by the instructor) was accomplished.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	fully	4	36.4	36.4	36.4
	to a great extent	4	36.4	36.4	72.7
	not completely	3	27.3	27.3	100.0
	Total	11	100.0	100.0	

All things considered, how would you rate the overall teaching effectiveness of this instructor?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	excellent	8	72.7	72.7	72.7
	good	3	27.3	27.3	100.0
	Total	11	100.0	100.0	

Which one of the following best describes your attendance in this class?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never absent	4	36.4	36.4	36.4
	rarely absent	6	54.5	54.5	90.9
	occasionally absent	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Which one of the following best describes the work you have been doing for this course?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I am doing okay without much effort.	2	18.2	18.2	18.2
	I am getting a lot out of the course but I have to work hard.	8	72.7	72.7	90.9
	None of the above is applicable.	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

Are there any outstandingly good features of this course?
The attention and advice from instructors; very practical, career-oriented attitude; great ideas
The understanding of instructors
The instructors fluidity and willingness to adapt/change greatly aided this course. Assignments were good and helped to move course forward.
You get to experience a lot of aspects of science outside of research.
The main activity, designing and running the clubs, is the most outstandingly good feature of the course. Fantastic experience.
Discussions with guest speakers are really informative and useful
This course was awesome. A bit heavy on work requirement, but it was very interesting and feel I am much more familiar with many types of outreach and how to go about planning for activities and presentations.
Yea, working with the middle school students was great! It changed up the pace of my week.
I love that this course allows us to run our own after school programs and go into the schools.
How open the class format was which I believe is imperative with this type of course.

Are there any outstandingly bad features of this course?
No
Since this was the first time having this course there was confusion at times. The class needs to be better organized. Students should be told when things are due and given advice on running their programs.
I enjoyed everything minus the reading. It might have been because I already had prior instruction in this are, but I didn't get anything out of it.
It was just work intensive. Some topics seemed a little unrelated to the main theme of the course, but they were quite interesting too.
The course was somewhat unfocused.
No.
The scheduling was difficult to manage at first.
In the beginning sometimes the communications between the groups and instructor weren't as good as they could've been. (Emails sometimes went missing or weren't responded to). This improved over the course of the year, but it could still get better.
The required texts seemed to be not useful, not helpful and a waste of $115.
Lectures by outside speakers seemed off the point. I know this will be changed, but more focus on making activities during mandatory class time would be ideal. Having students work on material outside of class puts a lot on students to be motivated to do "extra work," even if it's during normal class time. Having more people to bounce ideas off of would help, too. 2 people isn't enough to lead middle school activities.
Need much cleared grading policies; need to focus class goals to teaching our age-group; better aid in planning trips/surveys; more than 2 people per group

General Comments
Though I didn't have the best time in this class, I did learn a lot. I've never worked so closely with middle school aged students and I now better understand how to convey info to them. This will help me through my career.
Very good instructor and a fun enjoyable class.
N/A
More time in class discussing strategies and methods actually associated with preparing for and running the clubs would be helpful
I did like the variety of speakers/visitors, especially the zoo trip. Though it didn't help me specifically (besides the zoo trip!), I think they could help others trying to figure out what they want to do.
Other than communication issues I think this class was a good experience.
I appreciated the passion of the instructors with the subject matter
Loved the class, but I had issues with my partner, mostly because we were overloaded with work for 2 people.