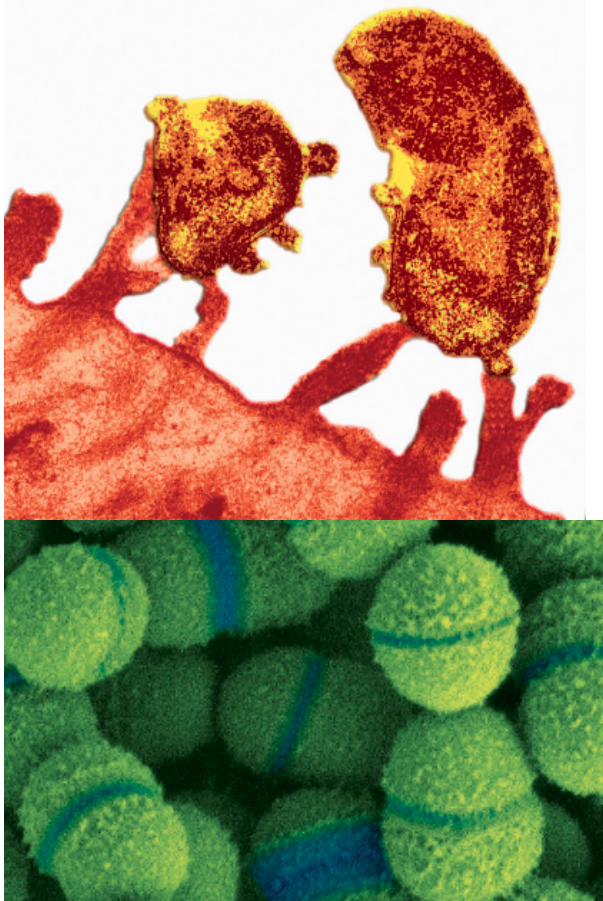
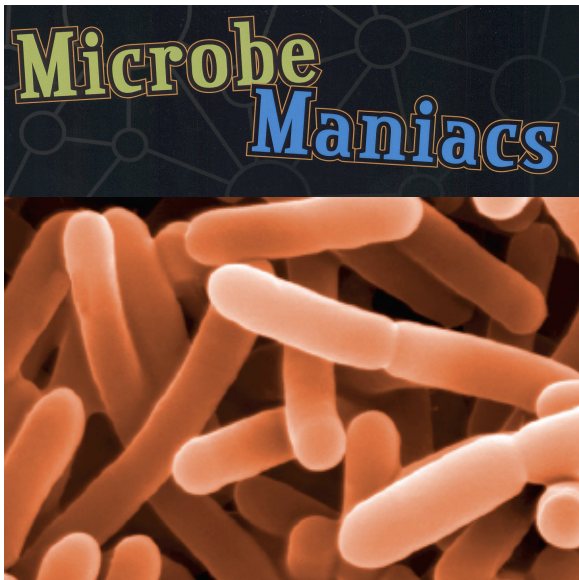


Microbe Maniacs Evaluation

Summer 2013

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Lincoln

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Microbe Maniacs Evaluation

Culler Middle School CLC Summer Program 2013

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Executive Summary

Microbe Maniacs, a summer program for middle level students, was designed to provide students with fun, engaging science experiences through hands-on microbe experiments and the creation of comics about microbes. This evaluation provides documentation of the weekly feedback about the summer program, which was used to make changes to the program for each successive session, and also reports findings about changes in student attitudes on pre- and post-survey administrations.

Feedback from the adult facilitators (N=11) was collected weekly and summarized. These weekly reports were provided to program staff to make adjustments as needed each week. These summaries are included in full in the Appendices.

Pre- and post-survey data were also collected from 121 youth who participated in the program. Students demonstrated an increased understanding of microbes from pre- to post-survey, and also experienced some positive change in their attitudes about science, reporting that they knew more about microbes and that they felt they were perceived as more of a “science person” after their Microbe Maniacs experience.

Overall, the Microbe Maniacs summer program provided engaging science content for middle level students. The questions, comments and reactions from students indicated many were interested and curious about the activities and about microbes, and the finished comics that the students created also reflected this. In addition, the survey results suggest that the program was beneficial to students and had a measurable impact on them.

Introduction

Program Overview

The Biology of Human (“BioHuman”) is funded through a National Institutes of Health (NIH) Science Partnership Award (SEPA). One project goal is to generate greater interest in biomedical careers, particularly among youth. “Microbe Maniacs,” a summer program for youth developed by the BioHuman project was offered in June 2013 as part of the Culler Middle School Community Learning Center (CLC) summer program. About one hundred twenty middle level students enrolled in the summer program, which ran for four weeks. “Microbe Maniacs” was a Thursday afternoon activity; contact time with the youth was about 90 minutes per week. Approximately half of the youth attended the early afternoon session (12:30-2:00), and half attended the later afternoon session (2:00-3:30). Students were organized into smaller groups within each session, with two or more adult facilitators assigned to help each group.

Each weekly session, except the final day, was organized around two activities: conducting a microbe experiment and drawing a comic. Each student was provided with their own drawing materials, a paperback copy of the World of Viruses graphic stories, and materials specific to the planned microbe activity each week. The schedule of activities was

somewhat fluid in that adjustments were made each week based on the prior week's feedback and experience. Table 1 provides a brief summary of each week's planned activities.

Table 1. Summary of "Microbe Maniacs" sessions

Session Date	Planned Activities
6/6/13	• Pre-survey administration of evaluation instrument (about 5 minutes) • introduction by microbiologist Andy Benson (for whole group) • microbe growing activity called "Growing Your Wildlife," • a comic drawing demonstration by comic artist Tom Floyd • time for the students to begin work on their own comics
6/13/13	• presentation introducing the DinoXcope • "Little Zoos" activity, looking closely at the growth in the petri dishes from the prior week • more time for students to work on their comics
6/20/13	• time for students to finish comics so they could be turned in and included in a published paperback • "Stuff of Life" activity, extracting DNA from cheek cells
6/27/13	• audio and slide documentary presentation by Jackie Sojico of Microbe Maniac experiences and reactions • wrap up activities: all students received copies of their "published" comics, a small gift from the museum, and their supplies to take home • post-survey administration of evaluation and learning research instrument, conducted in small groups and read aloud.

While most students attended all four scheduled sessions, several students missed one or more of the sessions during the month.

The Microbe Maniacs program focused primarily on providing the students with a fun, engaging science experience. While the activities included science content about microbes, the primary goal was to show science in an interesting way to encourage the youth to engage with science through fun, ungraded activities that were relevant to their own lives.

Purpose of Evaluation

The evaluation was designed to provide documentation and feedback about the summer Microbe Maniacs program to the project leadership and staff. The information was used on a weekly basis during the program to make changes for each successive week. A record of this feedback is provided in the appendices of this report so it can be used to help refine the activities and improve any similar future youth programs. In addition, self-report survey data were collected from the youth including pre- and post- measures of their attitudes and knowledge about microbes, their responses to the program as a whole, and measures of

more general science interest and identity. These data will be used to provide some additional feedback about the program and also for future planning and research.

Methods

To gather feedback on the microbe activities and student reactions to and questions about the materials and content, the activity facilitators were asked to complete a brief, open-ended instrument each week at the end of the day. These were summarized each week and provided to project leaders for use in planning and adjusting each successive week's activities. To gather information about student attitudes, a brief pre-survey was administered at the beginning of the first day of the program, and a longer post-survey was administered near the end of the last day of the program. See the Appendices for copies of these instruments.

The student pre-survey took about five minutes to administer, and students completed these independently as soon as they arrived for the first session. We observed that some students had difficulty completing the survey, so we decided to administer the post-survey differently. The post-survey, which was substantially longer, was administered in small group settings on the last day of the program. An adult read the survey items aloud as student each completed his/her individual written survey. In addition, three students who had been identified as Spanish speaking, beginning English Language Learners (ELL), were provided with a school staff member who verbally translated the survey items for them and worked individually with them to help them interpret and complete the survey.

Participants

Data were collected from a total of 121 student participants. Pretest information was gathered from 112 individuals, including 10 that were collected after the first week, meaning that those youth were absent from the first session. Post-test information was gathered from 89 individuals, and pre- to post-survey matches based on name were made for 80 youth. Some of the demographic questions were asked on the pretest and others were asked on the posttest, so the data are reported based on the number of individuals who responded to each item. Forty-five percent of those reporting gender were male (N=50), and 55% were female (N=61). The majority of participants (59%) indicated that they would be starting 6th grade in the fall (see Table 2 for a breakdown by grade level).

Table 2. Grade level of participants (N=107*)

Grade level Fall 2013	Number	Percent
6 th grade	63	59%
7 th grade	31	29%
8 th grade	12	11%
9 th grade	1	1%

*14 individuals had no grade level information.

Age of participants ranged from 9 years old to 14 years old, with just over half of all youth reporting themselves as 11 years old. See Table 3 for a breakdown by age.

Table 3. Age of participants in years (N=108*)

Age in years	Number	Percent
9 years old	1	1%
10 years old	17	16%
11 years old	55	51%
12 years old	24	22%
13 years old	9	8%
14 years old	2	2%

* 13 individuals had no age information.

Youth were asked to indicate their race/ethnicity by selecting “all that apply” from a list that included an “other” option. Twenty-five percent of the youth reporting their race/ethnicity selected multiple categories (N= 22). However, two students selected every category available, suggesting a false response set. In addition, the “other” category had a place for respondents to fill in the blank, and the students’ answers to this item reflect some of the complexity and confusion that are inherent in this item. Of the 28 students who indicated “other” for their race/ethnicity, half did not select any other category, although a few wrote in options that were provided, including Black, Hispanic, and White. Other responses among this group included “Mixed,” “Don’t remember,” “Middle Eastern/American,” “Iraq,” “Ukrany,” “Yizedy,” and “Indian/African American.” One quarter (N=7) of those marking “other” had also selected the “White” category, but then provided more specific information in the “other” category, such as “Dutch,” “German,” or “Irish.” The remaining students using the “other” category selected multiple categories that indicated mixed heritage, such as “White/African American,” and “Native American/Mexican.” Table 4 below shows the breakdown of reported race/ethnicity.

Table 4. Participants’ reported race/ethnicity (N=88*)

Race/ethnicity	Number	Percent*
Black or African American	16	18%
Asian	7	8%
American Indian or Alaska Native	7	8%
Native Hawaiian or other Pacific Islander	3	3%
White	40	45%
Hispanic or Latino	22	25%
Other	28	32%

*33 individuals had no race/ethnicity information;

*percentages add to more than 100% because participants were asked to select “all that apply”

To sort students into racial/ethnic categories similar to those used by the Lincoln Public Schools, students’ responses were categorized into either a single race/ethnic category or “two or more races” based on their responses. This resulted in the breakdown by race/ethnicity shown in Table 5.

Table 5. Participants' reported race/ethnicity (N=86*) using mutually exclusive categorization based on Lincoln Public School ethnic categories.

Race/ethnicity	Number	Percent*
Black or African American	9	10%
Asian	5	6%
American Indian or Alaska Native	1	1%
Native Hawaiian or other Pacific Islander	0	0%
White	37	43%
Hispanic or Latino	16	19%
Two or more races	18	21%

*35 individuals had no race/ethnicity information

Findings

Facilitator Feedback

The weekly feedback from the facilitators revealed the kinds of questions students had about the activities and about microbes, and also provided some general and specific recommendations for working with this age group in this format. The written comments included statements about what worked well each week, and about recommended changes. The feedback is summarized by week and presented in full in the Appendices.

Student Data

Two kinds of pre/post data were collected from the students: 1) knowledge of microbes and 2) attitudes and perceptions about microbes and science (see Appendices for copies of the instruments). While changes in knowledge about microbes was not necessarily anticipated in this short program, we gathered these data to have a greater understanding of what students this age understand about microbes and took advantage of the opportunity to see if there were any changes in students understanding.

Students were asked to assess whether each of eight given statements about microbes was true or false, or if they did not know the answer. Significant pre- to post- change was found on four of the items. These are shown in Table 6. This indicates that a substantial portion of students learned some of the big ideas presented through the activities.

Table 6. Statements about Microbes with Significant Change Pre- to Post-Test

Statement	Pre-test % of students answering correctly	Post-test % of students answering correctly	t value two-tailed, matched (N)
Microbes can make me healthy.	22%	70%	7.13*** (77)
Microbes are all over my body.	66%	95%	4.68*** (78)
My microbes help me digest food.	30%	71%	5.96*** (78)
Most microbes have DNA.	39%	69%	4.16*** (77)

***p < .001;

Students were also asked some attitudinal questions about microbes and science in general and the extent to which they agreed or disagreed with them on a 5-point Likert scale from strongly disagree to strongly agree. Significant change was found on two items from the pre- to the post-survey; these are shown in Table 7. No significant changes were found on any other items, pre- to post- survey. This suggests that while in most areas students did not change their opinions about microbes or attitudes about science, students thought that they had learned a lot about microbes, which was corroborated by the results on the content portion of the survey, and that they felt people viewed them more as a “science person” after their Microbe Maniacs experience. Both of these are positive changes and suggest the overall impact of the program was beneficial for the students. Microbe Maniacs increased students’ knowledge of microbes and appeared to move them a little more toward identifying themselves as “science kind of people.”

Table 7. Attitudinal Items with Significant Change Pre- to Post-Survey

Statement	Pre-test Mean (SD) (N)	Post-test Mean (SD) (N)	t value two-tailed, matched (N)
People in my life think of me as a science person.	2.33 (1.34) (66)	2.48 (1.48) (63)	2.24* (54)
I know a lot about microbes.	1.81 (1.12) (67)	2.94 1.20) (67)	5.50*** (56)

* $p < .05$; *** $p < .001$;

Summary

This evaluation was part of a larger data collection effort designed to serve not only program evaluation goals, but also to provide important data as a pilot for the learning research goals. This evaluation report serves two primary purposes: 1) to provide documentation of the feedback gathered from the facilitators during the program for use in future activity development and 2) to report findings about changes in students’ self-report responses pre- to post-program. The weekly feedback summaries, which are in the Appendices of this report, include information about students’ questions about microbes and the activities, comments about what worked well, and recommendations for changes.

Overall, the Microbe Maniacs summer program provided engaging science content for middle level students. The questions, comments and reactions from students indicated many were interested and curious about the activities and about microbes, and the finished comics that the students created also reflected this. Students demonstrated an increased understanding of microbes from pre- to post-survey, and also experienced some positive change in their attitudes about science, reporting that they knew more about microbes and that they felt they were perceived as more of a “science person” after their Microbe Maniacs experience. These results suggest that the program was beneficial to students and had a measurable impact on them.

Appendices

Example of Facilitator Feedback Form (Week 1)

Facilitator Name: _____ Group Team Color _____

Microbe Maniacs: Facilitator Feedback

Week 1: Growing Your Wildlife (use for both sessions 1 & 2)

1. What questions did students have? (about microbes or activity) Please write down ALL student questions here:

2. What worked well with this activity?

3. What changes do you recommend?

Any other comments? Use the back of the sheet for any additional comments.

Please return to: Amy Spiegel, 215 Teachers College Hall,
University of Nebraska-Lincoln, Lincoln, NE 68588-0384, aspiegel1@unl.edu, 402-472-0764
June 2013

Weekly Feedback Summaries

Microbe Maniacs Week 1: Growing Your Wildlife Feedback from Facilitators

Eleven (11) facilitators provided feedback about their experiences with the Culler Middle School youth on the first day of *Microbe Maniacs* summer program. Their comments are listed below. In cases where similar comments were made by multiple facilitators, the number of facilitators is listed in parentheses.

Questions from students

About activity:

- What should I do with my materials?
- What are we doing?
- What places should I choose?
- How to label petri dishes (2) Which side of the petri dish are we supposed to write on?
- How to sample surfaces (3) What do we do with the swab? Do I really just lick this swab?
- Can I do ... anything?
- What can't I poke the petri dish?
- Is it okay if I touched the red stuff [in the petri dish] in my mouth?
- Do I have to do one of these microbes?
- How do you spell ... ?
- Do we take this home?
- Some of them had more blank stares than questions.

About microbes:

- What do microbes do?
- What *are* microbes?
- Are they visible?
- What does the bacteriophage do?
- Whoa, so these are in my gut?

About cartoon activity:

- What is comic supposed to be about? Microbes?
- What should we draw?

Other questions:

- Is pre-survey a test? (2)
- Do we have to do this [activity]?

What worked well

General

- Presentations (3); Andy's talk/demo; Loved Tom drawing
- Having boys separated from girls
- Groups worked well together
- Making sure students were listening and quiet before explaining
- 95% worked like it was supposed to

Activity

- Instructions were clear
- Organization of materials was good (2)
- Kids loved swabbing activity (3) – figuring out what to swab was a lot of fun; swabs were cool, they liked using them; enjoyed telling each other what they swabbed.

Comic

- Comic drawing (3); Everyone seemed to enjoy comics – were very creative; kids loved comics

Recommended changes

General:

- Needed some time for ice breakers (3); there was no time for warm up or ground rules
- During marble demo (Andy Benson's presentation), it was difficult to see the demo well when all the students rushed up front (3). Marble activity seems good, but perhaps use something they can see better? Or count up colors and put on board for everyone to see and evaluate; Kids were kind of bored.
- For ELL kids, hard to listen to Andy's presentation
- Keep the kids quiet

Activity:

TIME:

- Need more time to explain microbe activity – we kind of jumped right in, and I'm not sure they understood the point
- Need more time for activity, so they can spend more time thinking about what would grow (2)

INSTRUCTIONS:

- Need to give students more background (3); Providing more specific information on what microbes are would be great. The kids seem ready to learn about microbes, I'd love to give them more info!
- Revamp plating procedures
- Give clearer swabbing instructions (2); tell them what end to open up the swabs; two kids pressed too hard on agar.
- Give clearer taping instructions

- Use less instructions – they were impatient to get to activity (2); didn't want to read instructions; too much writing on instructions. Better to start with just swabs and put on petri, then when/if questions.
- Start with the petri dishes taped shut and say on it: "wait to open"

MATERIALS

- Provide parafilm for petri dishes
- Include regular pencils with materials
- Use different colored agar – the red agar was hard to see through. Students who rubbed hard thought they got blood on their swabs.

Comic:

- More guidance on comic – what to draw, since students were hesitant to take the lead
- We need help with creativity connecting to real life
- Not sure how much they connected microbes with comics

Other comments

- Girls communicated best in the group
- Boys communicated best in smaller groups, more one-on-one
- For survey, maybe read aloud to them?
- Some kids were grossed out by swabbing
- Girls much easier than boys! Some boys defiant and tough

Microbe Maniacs Week 2: Little Zoos Feedback from Facilitators

Eleven (11) facilitators provided feedback about their experiences with the Culler Middle School youth for the second session of *Microbe Maniacs* summer program. Their comments are listed below. In cases where similar comments were made or reported by multiple facilitators, the number of comments is listed in parentheses.

Questions/Comments from students

About activity/microbes:

- What is that? [referring to the dinoscope and the microbes]
- How much magnification? Will magnification be color?
- Will they move?
- I don't even know what microbes are. What are they? [new student this week]
- What do bacteroides do?
- Do vegetarians have bacterioides, since it helps with animal proteins?
- Can I look at my microbe?
- What's this? (4) Eww! What is that?; What is that? [microbe colonies]; What are these microbes?
- We get to look at our microbes? Awesome!
- What will you do with our petri dishes?
- Why can't I touch the petri dishes?
- Why is that one yellow? (2); Why are the different colonies different colors?
- What is the stuff they're growing on?
- Eww. Why do they smell?
- Why do you wear the gloves?
- So microbes are bad for us then? (5) Is helicobacter pylori good or bad? ; Is that okay?! [microbes]; Would they kill us?; Would they make us sick?
- Why are they dangerous when they came from our own bodies?
- What is our table mascot? – esp. the drawing.
- What is that doing?
- They seemed reluctant and didn't seem to want to ask questions (only worked with the dinoscope though)

About cartoon activity:

- What can I draw my comic on? (2) What should I draw?
- Can we work on our comics at home?
- Can we work together?
- Can I take my [WoV] comic home?
- How should I draw this microbe?

Other questions:

- Will we get to take our folders home?

- What does bamboo look like?
- Do we have to do this? (2) What if I don't want to do this?
- Who is your girlfriend?
- Do I have dandruff?
- Are black widows deadly?
- What do you know about black widows?

What worked well

General

- Explaining things and bacteria fighting; being excited helped a lot
- Flexibility, not rushing to get through an activity
- Kids loved Malcolm and Abby
- Presentation of live spiders (2); Scared, excited at moving spider
- Keeping the kids on task and organized

Activity

- Small groups to use the dinoscope (2) Good to do 2x 2x at dinoscope
- Kids like the dinoscope (6); They LOVED the microscopes; Kids LOVED the dinoscope; Enjoyed dinoscope; The students got very excited about looking at stuff with the dinoscopes
- Exploring the growth plates was great
- Optional writing part – letting them look and discuss

Comic

- Drawing (3); Excited to draw again; The students got very invested in their comics
- Pencils
- Tom

Recommended changes

General:

- More explanation about the microbes before the dinoscope use.
- BIST
- None (2)

Activity:

- More detail in the first lab on how the dishes should be taped (2). I had to move the tape and then lids were loose and got abused by the 2nd group of students; Make sure they tape correctly
- Don't draw on front of petri dish
- Problem with condensation
- More science activities!
- Do more with zoo?

Comic:

- More structure to the comic book activity (2); Help with story ideas
- Many of the students seemed restless during the comic drawing portion – maybe this can be cut short? Or broken up?
- Some not sure about stories

Other comments

- The comic book activity – kids at our table struggled with the open-ended nature of the activity.
- Seemed to be more engaged this week (3); Things went well today!; Today was great
- One kid did NOT want to draw a comic (2); 1-2 kids did no drawing on paper
- 2nd group was a little more rushed than 1st group (2); Time on part of school was problematic, but not much to be done about that
- DO NOT ACCEPT MORE THAN ONE HELPER!
- Boy/girl mixed groups worked well!
- Getting Tom's autograph!
- No science in school
- Lots of questions, more bold
- Some choose to do nothing; more peaceful not trying to get them to read. NONE of them wanted to read the instructions ("Little Zoos")
- One kid did not want to see microbes (too gross)

Microbe Maniacs Week 3: Stuff of Life Feedback from Facilitators

Nine (9) facilitators provided feedback about their experiences with the Culler Middle School youth for the third weekly session of *Microbe Maniacs* summer program. Their comments are listed below. In cases where similar comments were made or reported by multiple facilitators, the number of comments is listed in parentheses.

Questions/Comments from students

About activity/microbes:

- Is it really painless?
- Is yeast a type of bacteria? (2) Is yeast a fungus or a bacteria? Is this a bacteria?
- Why did we use Gatorade?
- Why does the Gatorade turn cloudy?
- If the Gatorade is red, why is the final product pink? why is it pink?
- Why does alcohol separate the DNA?
- Is the white stuff the DNA?
- Can I clone myself from this?
- What are you doing with the leftover liquid? [in the test tube – the kids were actually interested in if there was still DNA in it, and if they could trust us with it]; I'm trusting you to get rid of it!
- Is there DNA in the leftover liquid?
- What does the alcohol do?
- Can we drink it?
- Why does it make two layers? How do the layers form?
- Why do you need to make two layers?
- What is left in the tube?
- Which one of these would kill you?
- How long does this take?
- Why didn't mine work?

About cartoon activity:

- What should my title be?
- Can I have another cover page?
- [Expressed] concerns about stories. Unsure what to draw. (2) What should I draw?
- Does my comic have to be about microbes? (2) Do I have to do a microbe comic?

Other questions:

- What is that? Can I hold it? [about horseshoe crab]
- Can I go extract my DNA?
- Does that [other style of pencil sharpener] have an eraser on it?
- Can I take this home?
- [Fewer questions this week; kids were focused on finishing their comics.]

What worked well

General

- Using the [DNA activity] station as an incentive to finish the comics (3) I think it worked really well that they had to finish their comic before being able to extract their DNA. At the same time, some students wanted to see their DNA but had a lot of work to do on their comic and nearly ran out of time; I think the time limit actually worked in our favor.
- The experiment didn't take too long, so the kids were able to finish up their comics, even if they did the DNA extraction
- Fun with Malcolm (2); Kids enjoyed working with the scopes.
- I think it worked well to have the kids come to the experiment when they were ready, rather than working at their tables. It gave them a chance to focus on their comics, and finish those.

Activity

- The station for extracting DNA; Once we got the workflow streamlined, we were able to get the kids through the stations quickly
- Kids really loved taking their DNA home.
- The kids knew what the DNA was, and they were excited about it. I think that this was about the right age group
- Having all the materials in one place was convenient, it cut down on the consumables that we had to have on hand, including alcohol, ice and lysis buffer. If the consumables had to all be on the same table, we might have run low on lysis buffer at one or more tables, but since they were all concentrated at one table, we didn't run low on any of the bottles.

Comic

- As far as comics go, very relaxed. They could take their time working on the comic & set their own schedule.
- The comics came together well.

Recommended changes

General:

- Maybe have a couple [kids] do DNA portion earlier. That room was very crowded at the end.
- The separation of genders.
- It would be good to up the organization (not sure how!), but our kids were a little frustrated to be told to sit down and then straight away moved to the other room.

Activity:

- Maybe let the people who think their DNA is gross to extract yeast DNA

- Better organization of DNA stations – learned from 1st session, 2nd was better, took time [to figure out how to organize the stations].
- The kids were interested and excited about getting their own DNA. Activities with something to take home seem to work really well.
- The workflow could be streamlined a little more – maybe separate tables for each step in the DNA extraction
- It got a little bit too hectic to be able to make the connection between microbes and DNA extraction – in the class presentation, I should have done a better job making that connection (eg: viral DNA in the human genome, DNA in all living things)
- Some of the kids had to go through the process twice to get any DNA, which slowed stuff down a bit.
- The process changed a little bit, but a little more training for the facilitators would have probably made everyone more comfortable with some of the steps of the process, specifically forming the two layers with the alcohol.
- Two stations back to back would have been a great way to keep the materials concentrated in one place while not increasing the amount of consumables needed.

Comic:

- [Spend a] longer time on comic books

Other comments

- They get more interested and engaged every week
- Kids nervous a little about drawing
- Kids so excited about Tom's drawings
- Hard to tell a story with microbes
- Kids were shy about their comics – some got too over their heads and felt discouraged that they couldn't finish.
- [It would be helpful to have] idea brainstorming as a group for comic ideas.
- In general, I was wondering why we've been reducing the amount of science activities each week in favor of the comics. I'm not sure this was a problem, but I felt bad that when kids were "grossed out" by an activity, there was less of an attempt to make them step up to the challenge.

Pre-Survey Instrument

Name: _____ Age: _____ Birthday: _____ Grade Next Year: _____

Microbe Maniacs Begins!

Please answer the questions below. We want to learn what you think about microbes.

ABOUT MICROBES:

1. Microbes are tiny organisms like viruses and bacteria.
☐ True
☐ False ☐ I don't know
2. Microbes can make me healthy.
☐ True
☐ False ☐ I don't know
3. Microbes are all over my body.
☐ True
☐ False ☐ I don't know
4. Microbes are a kind of human cell.
☐ True
☐ False ☐ I don't know

5. Microbes can kill.
☐ True
☐ False ☐ I don't know
6. Microbes are pretty much all the same.
☐ True
☐ False ☐ I don't know
7. My microbes help me digest food.
☐ True
☐ False ☐ I don't know
8. Most microbes have DNA.
☐ True
☐ False ☐ I don't know

ABOUT YOU & MICROBES: Please indicate how much you agree or disagree with the items below about science and microbes.

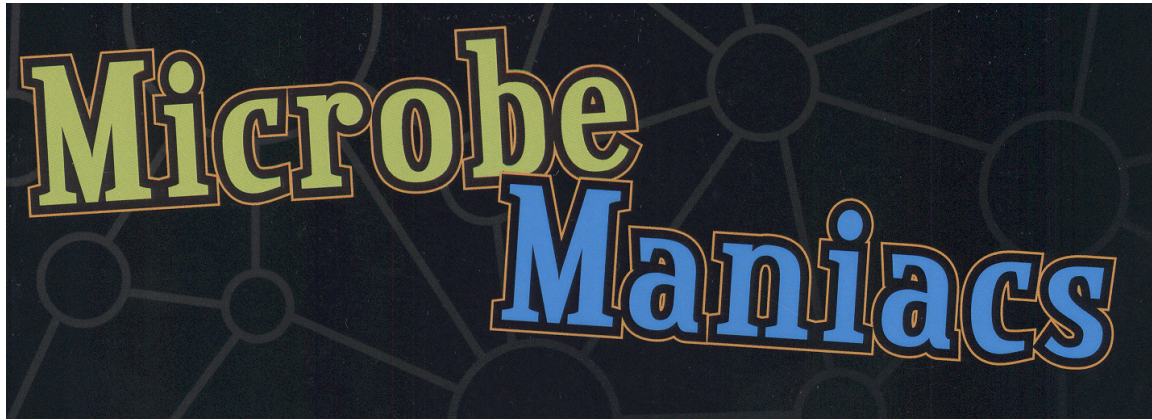
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	I Don't Know
9. I want to learn more about microbes.	☐	☐	☐	☐	☐	☐
10. There is no point in learning about microbes.	☐	☐	☐	☐	☐	☐
11. People in my life think of me as a science person.	☐	☐	☐	☐	☐	☐
12. It can be fun to learn about microbes.	☐	☐	☐	☐	☐	☐
13. People are healthier because of science.	☐	☐	☐	☐	☐	☐
14. I would like a job working with microbes.	☐	☐	☐	☐	☐	☐
15. Microbes are disgusting.	☐	☐	☐	☐	☐	☐
16. It is important that people study microbes.	☐	☐	☐	☐	☐	☐
17. Knowledge of microbes is useful.	☐	☐	☐	☐	☐	☐
18. Microbes can be interesting.	☐	☐	☐	☐	☐	☐
19. I am good at science.	☐	☐	☐	☐	☐	☐
20. People who study microbes can improve the world.	☐	☐	☐	☐	☐	☐
21. Learning about microbes is boring.	☐	☐	☐	☐	☐	☐
22. I like science.	☐	☐	☐	☐	☐	☐
23. I know a lot about microbes.	☐	☐	☐	☐	☐	☐
24. Knowing about microbes helps prevent disease.	☐	☐	☐	☐	☐	☐

ABOUT YOU:

25. What language(s) do you speak at home? _____
26. What do you do for fun? _____
27. Do you want to go to college some day? YES NO
28. What is your gender? _____

Thank you!

Post-Survey Instrument



We Need Your Help!

Please answer the questions on the following pages. We want to learn what you think about microbes.

Thank you for being a part of Microbe Maniacs!

Name: _____

What color was your folder

Blue

Black

Red

White

Gray

☐
☐
☐
☐
☐

My Likes and Dislikes

For each statement below, please mark how much you agree or disagree.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	
1. I like to take things apart to learn more about them.	☐	☐	☐	☐	☐	☐
2. I like to see how things are made (for example, ice-cream, TVs, iPhones, electricity, etc.).	☐	☐	☐	☐	☐	☐
3. I get excited learning about new discoveries or inventions.	☐	☐	☐	☐	☐	☐
4. I enjoy reading science fiction.	☐	☐	☐	☐	☐	☐
5. I am curious about the world.	☐	☐	☐	☐	☐	☐
6. It is fun to explore nature.	☐	☐	☐	☐	☐	☐
7. I like to collect things.	☐	☐	☐	☐	☐	☐
8. I like animals.	☐	☐	☐	☐	☐	☐
9. I like figuring out how the human body works.	☐	☐	☐	☐	☐	☐

My Learning and Science

For each statement below, please mark how much you agree or disagree.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	I Don't Know
10. I like science.	☐	☐	☐	☐	☐	☐
11. Science is important in many kinds of jobs.	☐	☐	☐	☐	☐	☐
12. Science is boring.	☐	☐	☐	☐	☐	☐
13. I usually do well in science.	☐	☐	☐	☐	☐	☐
14. Science is useful for solving everyday problems.	☐	☐	☐	☐	☐	☐
15. Science helps me make decisions that could affect my body.	☐	☐	☐	☐	☐	☐
16. Science is difficult to understand.	☐	☐	☐	☐	☐	☐
17. I'm just not a science person.	☐	☐	☐	☐	☐	☐
18. People are healthier because of science.	☐	☐	☐	☐	☐	☐
19. I would like a job that involves using science.	☐	☐	☐	☐	☐	☐
20. I am good at science.	☐	☐	☐	☐	☐	☐
21. It is important to do well in science.	☐	☐	☐	☐	☐	☐
22. Science is not one of my strengths.	☐	☐	☐	☐	☐	☐

My Family and Goals

For each statement below, please mark how much you agree or disagree.

23. I want to become a scientist.	☐	☐	☐	☐	☐	☐
24. My parents/guardians expect me to do well in school.	☐	☐	☐	☐	☐	☐
25. I could become a scientist.	☐	☐	☐	☐	☐	☐
26. My parents/guardians ask me how I am doing in school.	☐	☐	☐	☐	☐	☐
27. My teacher tells me that I am good at science.	☐	☐	☐	☐	☐	☐
28. People in my life think of me as a science person.	☐	☐	☐	☐	☐	☐
29. People like me could become scientists.	☐	☐	☐	☐	☐	☐
30. My friends like science.	☐	☐	☐	☐	☐	☐
31. My parents/guardians ask if I've gotten my homework done.	☐	☐	☐	☐	☐	☐
32. I would tell a friend to do Microbe Maniacs.	☐	☐	☐	☐	☐	☐

What I Think about Microbes

Please mark whether each statement is 'True,' 'False,' or if you don't know.

	True	False	I Don't Know
33. Microbes are tiny organisms like viruses and bacteria.	☐	☐	☐
34. Microbes can make me healthy.	☐	☐	☐
35. Microbes are all over my body.	☐	☐	☐
36. My microbes help me digest food.	☐	☐	☐
37. Microbes can kill.	☐	☐	☐
38. Microbes are pretty much all the same.	☐	☐	☐
39. Microbes are a kind of human cell.	☐	☐	☐
40. Most microbes have DNA.	☐	☐	☐
41. People who study microbes are scientists.	☐	☐	☐

For each statement below, please mark how much you agree or disagree.

						I Don't Know
42. Knowing about microbes is useful.	☐	☐	☐	☐	☐	☐
43. I know a lot about microbes.	☐	☐	☐	☐	☐	☐
44. I want to learn more about microbes.	☐	☐	☐	☐	☐	☐
45. Learning about microbes is boring.	☐	☐	☐	☐	☐	☐
46. It is important that people study microbes.	☐	☐	☐	☐	☐	☐
47. It can be fun to learn about microbes.	☐	☐	☐	☐	☐	☐

More about Me

Please answer the following questions by selecting one of the time frames.

	Never in the past year	Once or twice in the past year	A few times in the past year	Once or twice a month	At least once a week	Every day
48. How often do you visit the public library?	☐	☐	☐	☐	☐	☐
49. How often do you read comic books, manga, or graphic novels?	☐	☐	☐	☐	☐	☐

Please answer the following questions by selecting one of the options provided.

	Yes	No
50. I participated in a science club or camp besides Microbe Maniacs.	☐	☐
51. I talk to my friends about science.	☐	☐

When you want to know more about science, what do you do?

	Yes	No	I Don't Know
52. I ask a friend.	☐	☐	☐
53. I ask a teacher.	☐	☐	☐
54. I ask my parent/guardian.	☐	☐	☐
55. I look in a book.	☐	☐	☐
56. I search the Internet	☐	☐	☐
57. I do not do anything.	☐	☐	☐
58. I don't know what to do.	☐	☐	☐

59. I do something else (please describe:)

60. What is your race/ethnicity? Please select all that apply.

- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or other Pacific Islander
- ☐ White
- ☐ Hispanic or Latino
- ☐ Other: _____

Please answer the following question by selecting one of the options provided.

	Yes	No	I Don't Know
61. Did any of your parents/guardians go to college?	☐	☐	☐

Please answer the following question by writing your response in the space provided.

63. What elementary school did you go to?

I give my permission to use my answers from the Microbe Maniacs activities for research.

- ☐ I Agree
- ☐ I Disagree

Please share any comments you have about Microbe Maniacs below.