

2021 Summer STEM Academy Survey Responses

The 2021 Summer STEM Academy at UCA designed around four principal objectives:

1. Students will design, implement, and interpret the results of experiments that investigate authentic scientific questions that are outside the scope of standard school curriculum.
2. Students will seek and explore connections between mathematics and sciences, with particular emphasis on biology, statistics, and computer science.
3. Increase student use of, proficiency with, and confidence in technology, statistical methods, and laboratory procedures.
4. Students 21st century skills (collaboration, communication, creativity, critical thinking) as students work in teams to design, implement, analyze, and present scientific research.

The program served 23 rising 9-11 grade students in June 2021. Participants designed, implemented, and analyzed a microbiology experiment over the course of the week, learning principles and procedures through three integrated, interdisciplinary courses: microbiology, empirical modeling, and computer programming.

End of program survey responses demonstrate the impact of an integrated STEM experience on students and illustrate that these goals were largely accomplished. Participants agreed or strongly agreed with nearly all items, including items related to affect (enthusiasm and comfort level), knowledge gains, and program structure.

In short response items, many participants highlighted how much they enjoyed the hands-on nature of the work. The work in the microbiology lab was the most common response to the prompt "What did you like best about the program", where some participants also noted the hands-on work. Hands-on involvement was also noted as a key difference between the program and courses during the school year. One participant response to the prompt "In what ways, if any, did you feel like this program differed from your classes during the school year?" summarized many others:

It [the program] had much more hands on learning and was more tailored to each student's and group's needs. It allowed free thinking and open discussion more than most of my classes during the school year.

Other participants noted that the program courses "were more entertaining and fun than regular classes" and that math and science were "a lot more interesting and engaging than school". Other students noted that it was "a lot more intensive and focused on learning," and that they "felt like I learned more here than at a school - actually FUN."

When asked to describe what they learned, participants consistently noted knowledge they gained in microbiology and coding. In addition, they highlighted the design of scientific experiments and "how to collaborate the different kinds of science together".

Overall, responses suggest a positive experience for participants, and that the program accomplished its major objectives.

Table 1: Mean and Median Responses for 5-point Likert Scale Items (1- Strongly Disagree, 5 - Strongly Agree)

	Mean (n=21)	Median
This program made me more enthusiastic about engaging in the scientific process	4.19	4
I feel more knowledgeable about the scientific process and experimental design than I did at the beginning of the program.	4.71	5
During the program, I learned content that was beyond the scope of what I learned in school.	4.71	5
The program helped me understand connections between biology, mathematics, and computer science	4.52	5
Hands-on technology and use of technology made the program more interesting	4.90	5
The instructors presented the topics in a fashion that allowed me to learn and understand them	4.29	4
I received sufficient support for working on my project	4.48	5
I feel more comfortable applying statistical methods and technology to scientific questions than I did at the beginning of the program	4.43	5
I feel that the project allowed me to further develop collaboration and communication skills	3.90	4
I feel that the project allowed me to be creative and engage in critical thinking	4.33	4

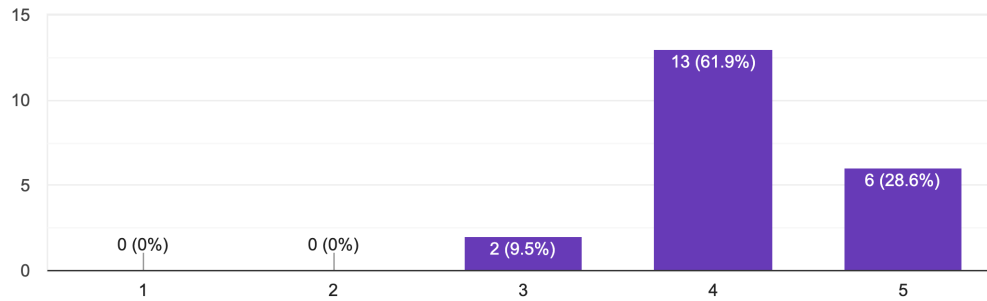
Final Survey Raw Data:

https://docs.google.com/spreadsheets/d/1pmr31v2jLQ_RCqLbU1P9XsH8ZS68gDtJLOtBSqE2YuE/edit?usp=sharing

Final Survey Response Distributions by Question:

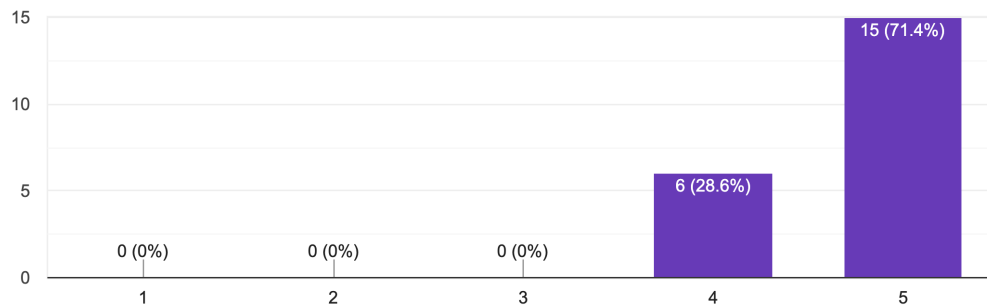
This program made me more enthusiastic about engaging in the scientific process.

21 responses



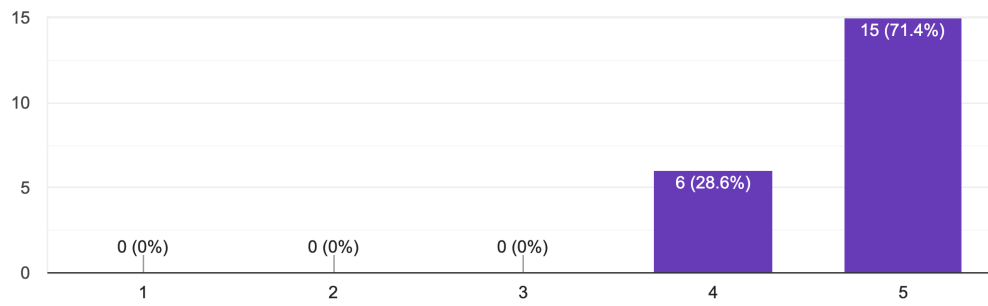
I feel more knowledgeable about the scientific process and experimental design than I did at the beginning of the program.

21 responses



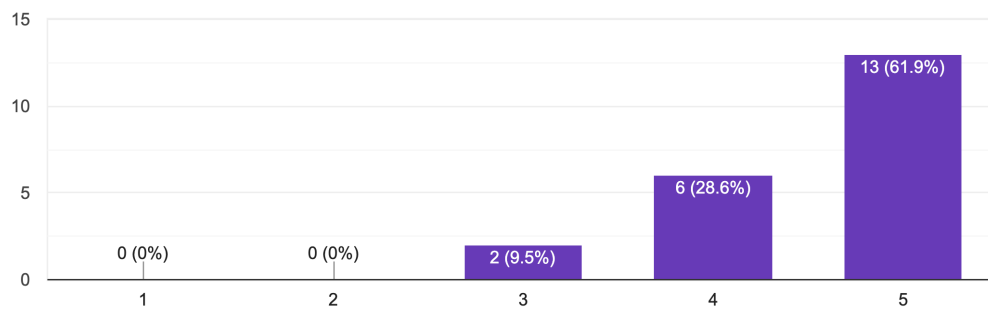
During the program, I learned content that was beyond the scope of what I had learned in school.

21 responses



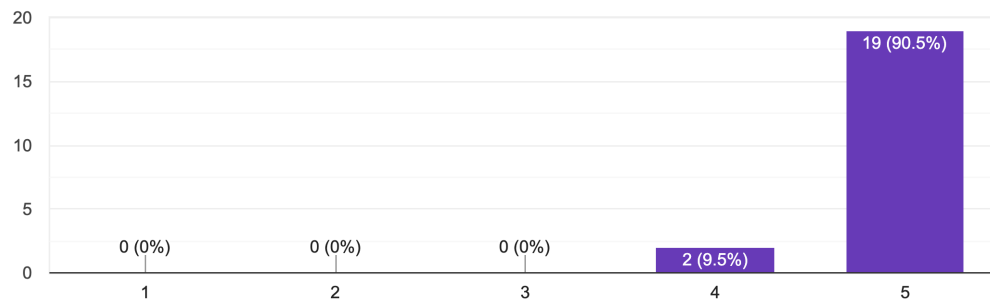
The program helped me understand connections between biology, mathematics, and computer science.

21 responses



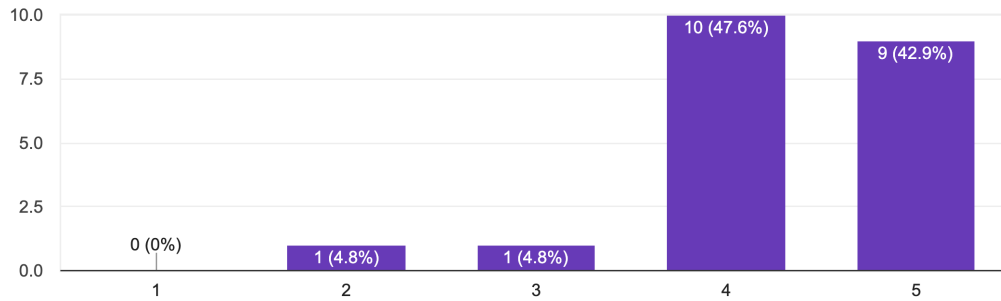
Hands-on activities and use of technology made the program more interesting.

21 responses



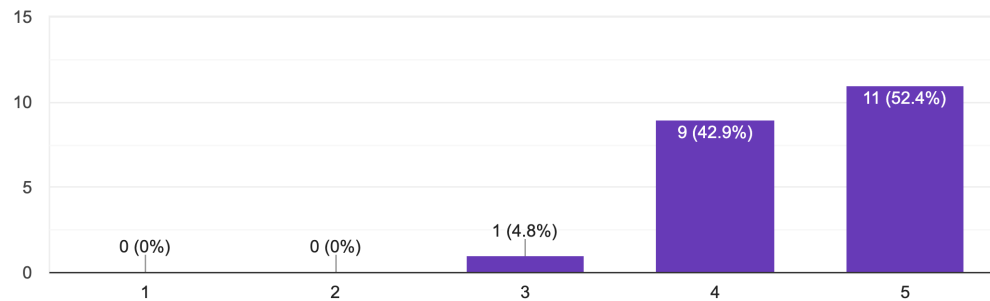
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21 responses



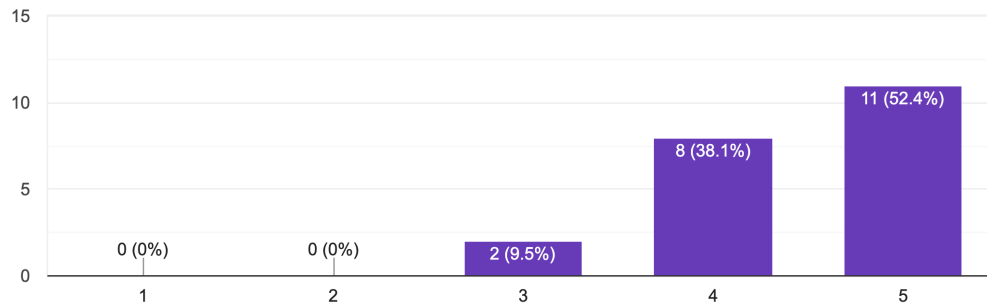
I received sufficient support for working on my project.

21 responses



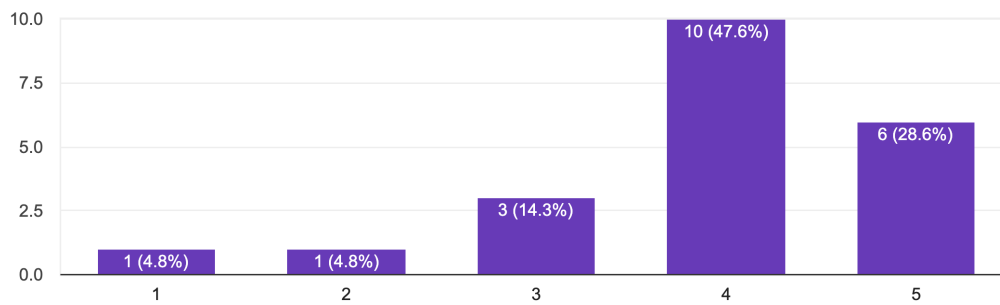
I feel more comfortable applying statistical methods and technology to scientific questions than I did at the beginning of the program.

21 responses



I feel that the project allowed me to further develop collaboration and communication skills.

21 responses



I feel that the project allowed me to be creative and engage in critical thinking.

21 responses

