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UI Scientists in the Classroom

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PURPOSE AND AUDIENCE

UI Scientists in the Classroom (UISIC) was created by Alyson Glynn, Cassandra Poulos, Kelsey Willardson, and Mason LaMarche in order to support local elementary schools in teaching science courses. UISIC seeks to bring in real scientists from the community to devise hands-on projects for the students which follows the current curriculum of the school. This combination of active participation and teaching presented by an individual who uses science in their career helps to further engage the students as a supplement to their science classes.

AUDIENCE AND PARTNERS

For this pilot year, we worked with Robert Lucas Elementary School in Iowa City. With the help of our teacher-partners Kirk Ryan and Mark Stern, we provided two days of STEM education to the 3rd and 5th grade science classes. Prior to our teaching days, a great deal of research had to be done to orient ourselves with the curriculum and expectations of the classroom. While collaborating with Mr. Ryan and Mr. Stern, our group explored the National Science Education Standards in order to familiarize ourselves with the goals of each unit. The resources provided by our teacher-partners helped greatly with the easy transition we made to insert ourselves into the curriculum.

CLASSROOM EXPERIENCE

In the classroom, we had the opportunity to take the reins and move the lesson plan forward with the guidance of our teacher-partners. The teaching expertise of Mr. Ryan and Mr. Stern allowed us to comfortably discuss something that each of us is very passionate about: science. The highlight of our visit came on the second day when we implemented activities related to the science we had discussed the day before. In Mr. Stern’s 5th grade class, we worked with model digestive systems. Using household items, some pantyhose, and crackers, our students crushed, mashed, and squeezed their way through the entire digestive tract. Each physical motion was accompanied by a brief quizzing of the students to ensure they were applying the concepts we discussed on the first day. Audible ewws and giggles filled the classroom, and our post-activity tests helped to confirm that the students had a great time while also enjoying how we use our senses to understand science. Listen to the audio clip in order to hear the reactions of the students as we led them through each step of the activity. Below are photographs of each main step of the activity.
1 5th grade students began the experiment by crushing up crackers and lettuce with orange juice to simulate the act of stomach acid dissolving food. This represented one of the first steps of the Digestive System.

2 The 5th grade students then emptied the food and liquid into pantyhose, which represented the small intestine, and allowed the food to travel to the bottom. They then squeezed out the water, which is traditionally the role of the large intestine.
We then snipped the bottom of the pantyhose, where the food had accumulated, into plastic bowls. This represented the act of excreting waste and thus ending the digestion process.

Mason LaMarche explains each step of the activity as the 5th grade students follow his instructions. Here, he shows the students how yellow food coloring can represent bile, which breaks down fats in our diet.
In Mr. Ryan’s 3rd grade class, the students learned about plant and seed structures. On the first day, the class observed the growth of seedlings they had previously placed in wet paper towels. The kids were able to see the growth and how the seeds did not need soil in order to grow. Students brainstormed why seeds do not need soil and where the nutrients come from to allow the plants to grow. They reviewed on the second day and participated in class discussion as well as visual learning with plant examples. They then learned about hydroponics and its variety of applications and were able to start their own hydroponics growing station. They finished the class by watching an interactive video about hydroponics and taking a comprehensive quiz, giving them the opportunity to show how much they learned.

5 The 5th grade students eagerly raise their hands as Cassandra Poulos leads them through Follow Up Questions to identify what each item represented in the Digestive System.

6 Lively class discussion on how humans benefit from plants absorbing carbon dioxide and producing oxygen.
OUR IMPACT

With the success of this program, we have established a model that future programs through Latham that could involve active classroom involvement in the STEM field. Potential partnerships could be explored

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7 Some of our intent listeners during the explanation of hydroponics.
8 Reviewing information from day one and going over plant structures.
through the Iowa City community to expand this program, and the recruitment of other researchers and students would allow for this project to be sustained and refined to better adjust to the needs of individual schools. The children we had a chance to interact with greatly enjoyed the interactive "break" from the traditional curriculum, and the use of invited teachers is a beneficial tool for the classroom teacher to utilize in order to sustain interest in science. Teachers are often bound to their curriculums and do not have the time or money to engage their students in interactive projects such as ours. When we initially viewed the 5th grade classes schedule, we noticed that the curriculum dictated that they watch an hour long movie describing the digestive process and various experiments. We were able to replace the movie with a hands on, interactive activity that supplemented the curriculum in an exciting way. Ultimately, this program seeks to focus on teaching children about the process and action of studying science which is an important addition to the traditional curriculum which focuses on knowledge acquisition. In addition, this project served to show children what scientists look like. We are not intimidating or boring and they were truly interested in what we do and what we study. Any person is capable of understanding science and it was our goal to allow these children to see that any person can become a scientist.

In order to examine how well these students were able to retain the material after our activity, we administered pre-tests and post-tests. Graphs of their scores are shown below. In the 5th grade classes, the students performed significantly better on the multiple choice test given after the activity than on the open ended questions given before the lesson.

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9 This graph shows the responses from 5th grade students when asked three open ended questions about Nutrition and the Digestive System.
In the third grade class, the pretest was largely multiple choice and the posttest was mostly free answer. There was quite a bit of variance in scores between tests, but most students were able to explain key concepts (focused on in questions 3 and 5) from the lesson after the second day.

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10 This graph shows the scores of 5th grade students when asked 5 multiple choice questions about Nutrition and the Digestive System.

11 Third grade pretest scores from multiple choice test.
LESSONS LEARNED

The development of this program was not without its flaws. Many times, we were left frustrated, confused, and bewildered between our lack of educational experience and working with many busy schedules. Pulling together a successful project requires constant follow up emails, thorough planning, and trial and error as the project continues to evolve. We learned that we needed to adapt to the situation as the moment passed and make adjustments as we went. This could not have been more evident than when we used yellow food coloring in our “hands on” digestive system activity. We stifled giggles and exchanged sheepish glances as the children lined up at the sink looking at us incredulously with yellow stained hands. Needless to say, we quickly adjusted and removed that step from the experiment with the following two classes. We may have encountered obstacles, but it only made the final outcome so much sweeter. It also became evident that flexibility is key when working with ironclad curriculums and young students. We needed to be able to adapt our activities and teaching styles to their built in schedule in order to appropriately convey the material and adhere to their program.

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12 Third grade posttest scores from matching/free response test.