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The Creation of a Cross-Age Scientific Curricular Experience Program Model: Exploring Instructor Self-Efficacy and Learner Engagement

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Abstract

Students teaching students is widely accepted to be one of the most effective teaching methods with benefits for both the students teaching and those that are learning (Sorcinelli, 1991; Stigmar, 2016). Previous studies have found that students acting as instructors experience improved content knowledge and develop skills and confidence in communication of complex subject matter (Swim, 1999). Students learning from other students experience increased enjoyment and enthusiasm in learning science (Hinck, 2013; Rao et al., 2007). We created a cross-age scientific curricular experience program model that utilized hands-on activities with instruction by trained high school students. This study aims to understand how these curricular experiences impact the self-efficacy of student instructors as well as student learner engagement. We found that student instructors commonly have positive teaching experiences and feel more confident about teaching after each curricular experience. Student engagement during all curricular experiences was high and reflections from instructors, students, and classroom-teachers highlighted the benefits of students teaching students. Overall, this study shows support for cross-age instruction and the importance of hands-on activities in scientific education. We hope educators increase cross-age instruction and hands-on activities throughout their science classes.

Keywords

cross-age, self-efficacy, student engagement

Introduction

Hands-on learning in scientific programs has been shown to improve content understanding and recall, as well as critical thinking skills (Haury & Rillero, 1992). Studies have also found positive improvement in student performance and participation when a hands-on instructional approach was used (Ekwueme et al., 2015). In an effort to increase opportunities for hands-on scientific activities within our school and engage our research-focused high school students, we developed a program that utilizes these dual-enrolled high school students as assistants and instructors during scientific curricular experiences held within our Imaging Lab Curriculum Integration Program, also known as the S.T.A.R. program. Modeled after similar scientific outreach and near-peer mentoring programs (Pluth et al., 2015), the S.T.A.R. – student talent ambassadors for results – program aims to create an effective student instruction program that increases student engagement and improves understanding of content. Additionally, this program aims to provide opportunities for high school students to learn, practice, and implement skills related to teaching, public speaking, and professional development.

The S.T.A.R program includes a rigorous eligibility and application process. Students can apply in grade 9 and can act as assistants but are only eligible to become instructors in grades 10-12. All instructors must have previous experience working in the Imaging Lab and/or are currently involved in or have previous research experience. These S.T.A.R. instructors are trained in and assist with delivering scientific instruction and curricular experiences to students across grades K-9.

This research aims to understand the experience of S.T.A.R. instructors as they train for, prepare for, and provide engaging, hands-on scientific curricular experiences. The following research questions guided this study:

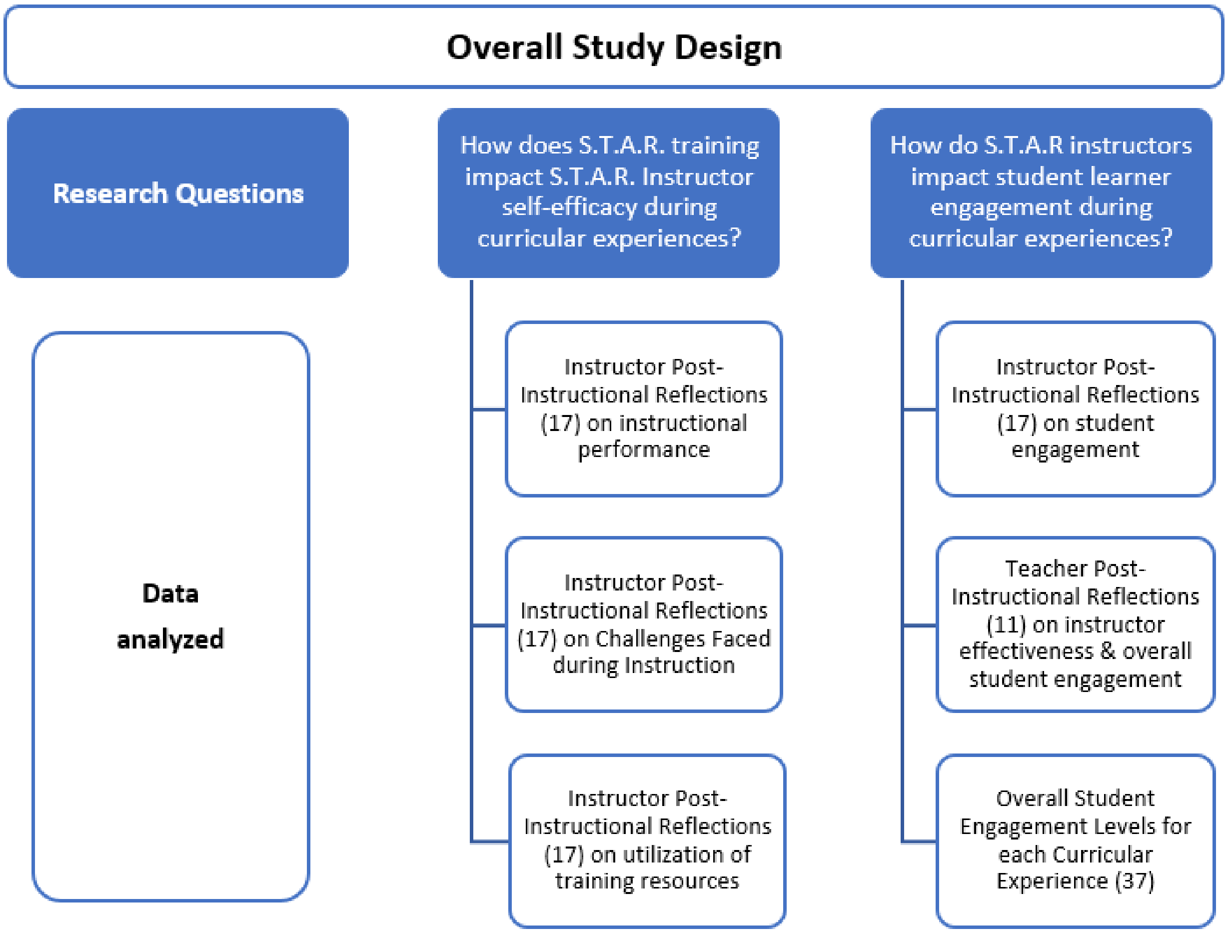
1. How does S.T.A.R. training impact S.T.A.R. instructor self-efficacy during curricular experiences?

2. How do S.T.A.R. instructors impact student learner engagement during curricular experiences?

Understanding how our S.T.A.R. program training objectives impact S.T.A.R. instructional performance allows us to ensure that training objectives align with the needs of our S.T.A.R. instructors and improves the overall effectiveness of the curricular experience. This research implemented standardized evaluation techniques that allowed for continual evaluation and improvement of the S.T.A.R. training and curricular experiences. Utilizing an evaluation strategy that collects reflections from S.T.A.R. instructors, classroom teachers, and students helps us truly understand the impact this program has on those involved (Figure 1). We hope this will become a model for other educators and encourages them to implement hands-on cross-age curricular experiences.

Figure 1

Overall Study Design Including Research Questions and Associated Data Utilized to Answer Each Question



Literature Review

Students Teaching Students

Numerous studies have indicated that students teaching students is one of the most effective teaching methods available (Anderson et. al., 2019; Rubin & Hebert, 1998; Sorcinelli, 1991; Whitman, 1988). Students who teach other students gain powerful communication and teaching skills and can practice those skills often, resulting in stronger self-efficacy that is beneficial both inside and outside the classroom (Wagner & Gansemer-Topf, 2005). Student instructors can gain increased understanding in subject content as well as improved skills related to critical thinking, learning autonomy, and communication (Stigmar, 2016; Wagner & Gansemer-Topf, 2005). High school students, when acting as instructors, gain skills in communication and confidence in presenting complex topics (Swim, 1999). Engagement levels in elementary learners during cross-age curricular experiences has been shown to be high during activities and students have expressed enjoyment in learning science from high school students (Hinck, 2013). Cross-age teaching of scientific standards has also been shown to change student perceptions of science and increase enthusiasm for science in younger students (Rao et al., 2007).

Benefits of Hands-On Learning

Although the benefits of hands-on learning in young students is clear (Ekwueme et al., 2015; National Science Board, 1991, p. 27), there are a multitude of considerations to consider to be sure the lessons are a high-quality learning experience for students (Kirschner et. al., 2004). Research has cited that teachers report the benefits of hands-on learning to be increased engagement in lessons, stimulates many different types of learners, increased content retention, and student empowerment in the process (Haury & Rillero, 1994).

Methodology

Context

Research was conducted on curricular experiences occurring within grade-level classrooms, an elementary lab, and a high school scientific imaging lab across K-9th grades. Curricular experiences were designed by the research program faculty in collaboration with the associated classroom teacher. After designing the lesson plan, research program faculty would provide training resources to S.T.A.R. instructors through hands-on instruction, role-playing training experiences as well as providing lesson plans, specific lesson questions/information and supplemental lesson-related presentations and resources such as station set-up photos and information. S.T.A.R. instructors included in this research study comprise a group of 12 students across grades 10-12 who have previous laboratory and research experience. Within this group of twelve instructors, half are Asian or Pacific Islander, a quarter are Hispanic/Latino, two are Black/Non-Hispanic and one instructor is White/Non-Hispanic. Each S.T.A.R. instructor is a part of an accelerated pre-collegiate program that requires students to be fully dual enrolled in a university starting in 10th grade. S.T.A.R. instructors typically teach students in small groups (up to seven students) during each curricular experience under the supervision of research program faculty, school staff, and classroom teachers and aides (Figure 2). Research was conducted on curricular experiences that occurred from August 2022 to March 2023, evaluating S.T.A.R instructional performance and student engagement. Students were from grades K-9 of a developmental research (lab) school with the mission of enhancing instruction and research to improve outcomes for all students. Each curricular experience was designed specifically to grade-level standards. The number of students ranged from 20-25 students per class (60-75 students total per grade). See Table 1 for examples of lessons taught at each grade level, the class size and lesson duration.

The action of this study has three sections: providing training resources to the S.T.A.R. instructors, evaluating learner engagement and analysis of the S.T.A.R instructor, classroom teacher, and student reflections. The breadth of the program is defined by the grades of students taught, as well as the standards addressed within each lesson. Information regarding the equipment, activities and worksheets used during instruction was collected for each curricular experience but is not analyzed for this study.

Table 1

Example of Curricular Experiences per Grade Level Including Lesson Description, Average Number of Students Per Class and Duration of Lesson

Example of Curricular Experiences across Grades K-9			
Lesson Description	**Grade Level**	**Average Number of Students per Class**	**Duration of Lesson per Class**
Plant & Animal Characteristics	Kindergarten	20	40 minutes
Observations & Using your Senses	1st Grade	20	45 minutes
Rocks and Soils	2nd Grade	20	60 minutes
Scientific Tools	3rd Grade	20	45 Minutes
Flower Dissection & Nomenclature	4th Grade	24	60 Minutes
Microscopic Plant Parts	5th Grade	24	45 Minutes
Frog Dissections	6th Grade	24	90 Minutes
Fossils	7th Grade	24	90 Minutes
Shark Dissections	8th Grade	24	90 Minutes
Bioimaging Lab Exploration	9th Grade	30	45 Minutes

Figure 2

Images of S.T.A.R. Instructors with Students During Various Curricular Experiences

Data Collection

Data was collected during and after each curricular experience. More specifically, observations related to student engagement and behavioral/attention issues were collected by program staff during each curricular experience to evaluate engagement levels. S.T.A.R. instructors provided reflections on their instructional performance after each curricular experience. After the curricular experience, student learners and classroom teachers provided reflections to help us better understand the impacts of the curricular experience on overall student learning. For the purpose of this study, data collected through S.T.A.R. instructor, student, and classroom teacher reflections after instruction will be analyzed to address the research questions. Student learner reflections were not analyzed for this study.

Questionnaires. After each curricular experience, we collected reflections from S.T.A.R. instructors, students, and classroom teachers. S.T.A.R. instructors reflected on their instructional performance by answering four open ended questions related to how they felt about their instructional performance, their most challenging moments during instruction, student engagement, and how training has helped their instruction (Appendix A). Students were asked four questions after each curricular experience (Appendix B) to better understand how the experience impacted them and to explore their feelings about learning from the high school students as well as future learning opportunities. These reflections were not analyzed to answer the questions in this study. Classroom teachers provided feedback about all aspects of the curricular experience, their opinions on the S.T.A.R instructor and staff instructional performance and their students' learning outcomes (Appendix C).

Observational data collection. During each curricular experience we collected observations of student disengagement and behavioral/attention issues during each activity (Table 2). Behavioral and attention issues were noted throughout each lesson by faculty, staff, and classroom teachers. Additionally, observations of the number of students disengaged and the number of times distractions and disengagement occurred throughout the activity were also noted. These notes were analyzed and allowed us to define three levels of behavioral/attention issues (None/Low, Low/Medium, Medium/High) and three levels of engagement (low, medium, high). Behavioral/attentional issue levels were defined by the number of disruptions and the ability for students to re-engage. If students experienced multiple disruptions preventing them from re-engaging in the lesson quickly, the lesson was defined as having a medium/high level of behavioral/attention issues. Engagement levels were defined by number of students impacted by the disruption and the number of times the disruption occurred. Low engagement is defined as consistent disengagement impacting 50-75% of the students whereas, high engagement is defined as minimal limited disengagement that impacts 0-25% of students. For example, if more than three students were distracted/disrupted by a behavioral/attention issue that occurred multiple times throughout the lesson, they were rated as having a low engagement level. Analyzing both the behavioral/attention issues and disengagement allowed us to determine an overall engagement level for each curricular experience. High overall engagement levels were defined as having high engagement levels with little to no behavioral/attention issues. Whereas curricular experiences with low overall engagement levels were defined as having low levels of engagement with medium-high behavioral/attention issues.

Table 2

Definitions of Levels of Engagement and Behavioral/Attention Issues and Explanation of Their Inverse Relationship and Resulting Outcome of Overall Engagement Level

Defining Relationship Between Engagement Level and Behavioral/Attention Issues Observations		
Engagement Level – % of students impacted by disruption – Amount of Time and/or reoccurrence of disruption	**Behavioral/Attention Issues**	**Overall Engagement Level defined as:**
High – 0-25% - Very Minimal dis-engagement, only once or twice.	**None - Low** – minimal, brief distractions, students re-engage quickly	**High** – students maintain focus, are productively engaged, and re-engage quickly after minimal disruption
Medium – 25-50% - short periods of dis-engagement, happening more than two times	**Low-Medium** – short but multiple distractions, students quickly re-engage	**Medium** – students are distracted multiple times but re-engage quickly after each distraction
Low -50-75% - majority of activity/class, consistent dis-engagement	**Medium-High** – consistent distractions for longer time periods, students unable to quickly re-engage	**Low** – students are highly distracted, and learning is disrupted, difficult to re-engage after each disruption

Data Analysis

Post-instructional reflections retrieved from S.T.A.R. instructors were coded by themes and analyzed by theme abundance for each of the relevant reflection questions. Observational data related to engagement and behavioral/attention issues were analyzed to determine an overall engagement level for each curricular experience. Analysis of engagement levels by curricular experience was completed by comparing abundance of overall engagement levels across all experiences. Classroom teacher reflections were evaluated by questions, average rating, and themes found in written responses.

Results

Overall, 75 reflections and observations were collected across all study groups. Table 3 outlines the number of reflections and observations obtained from each study group from August 2022 to March 2023.

Table 3

Count of Reflections/Observations by Type

Total Number of Reflections/Observations			
S.T.A.R. instructor Post-Instruction Reflections	Student Engagement Observations	Classroom Teacher - Reflections	**Total Number of Reflections & Observations**
17	37	11	**65**

To determine how S.T.A.R. training impacted S.T.A.R. instructor self-efficacy during curricular experiences, we coded 17 S.T.A.R. instructor reflections by theme and analyzed theme abundance across three post-instructional reflection questions asking instructors how they felt about their instructional performance, challenges they faced during instruction, and how training helped their instruction. After analysis, we found the following:

1. S.T.A.R. instructors commonly report positive experiences teaching students and feel more positive and confident about teaching after each instructional experience

Overall, S.T.A.R. instructors reported positive experiences when teaching students. Three main themes; effective communication with students, the ability to meet the learning objectives, and successfully teaching students to use equipment were related to positive reflections and indicate the three main reasons why S.T.A.R. instructors define their instruction as positive and successful. S.T.A.R. instructors also noted that they feel more positive about teaching after each instructional experience.

Question one, "How do you feel about your instructional performance today?" reviewed S.T.A.R. instructor self-perceptions of their overall instructional performance with 16 out of 17 reflections reporting positive experiences teaching students. Some of the students expanded on their reflections and included information about what aspects of their instructional performance made them feel successful. Four instructors referenced that they thought their instructional performance was successful because they were able to effectively communicate with students. Two other instructors felt they were successful because of their ability to meet the learning objectives while two others referenced skills instruction such as viewing specimens under the microscope.

Supporting reflections:

- *"I feel very good about my instructional performance, I think I explained what I needed to in an effective way."*
- *"I think it went well. I was able to communicate what I had to with the students."*
- *"I thought I did well and communication between me and the kids was effective in their learning."*
- *"I felt comfortable guiding them through viewing specimens under the microscope."*

2. S.T.A.R. instructors reported on challenges but found ways to keep students engaged

S.T.A.R. instructors reflected on their most challenging moments during instruction and the reasons behind the challenges in question two, "What was your most challenging moment and why?" Eleven of the 17 responses were related to issues keeping students engaged due to issues with attention/focus related to distractions within/near the station or student behavior.

- *"The most challenging moment was keeping them focused on the station and not distracted by the plants and microscope."*

Three of the 17 responses reported challenges related to difficulty explaining complex topics, answering difficult questions, and a lack of student background knowledge.

- *"My most challenging moment was explaining what density is to them when looking at the CT scan of the rose, they didn't quite get it. Also, speaking in a manner that they can understand without using any fancy words."*

- *"I think my most challenging moment was answering questions that I didn't know the exact answer to. Either way I will let them know that I don't know the answer and will ask someone who knows to give them a more accurate response."*

Overall, S.T.A.R. instructors report the most challenging aspects of instruction are related to keeping students engaged, teaching complex topics, and changing strategy upon discovering students lack content knowledge. Despite challenges, S.T.A.R. instructors noted that they kept students engaged by re-directing students, using words that students could understand, and asking for help when stumped by a student's question.

- *"It was a little bit challenging to stay on topic with one specific group: three girls were really close friends and wanted to talk about anything except for the topic of my station, so it took a second to acknowledge what they were saying and then transition to the topic but it worked out just fine!"*

- *"The most challenging moment was directing the students to using only one microcentrifuge, but that wasn't too difficult."*

S.T.A.R. instructors found training related to instruction and content knowledge was helpful

Training for S.T.A.R instructors ranged from in-person hands-on instruction and role-playing to review of lesson plans, specific lesson questions/information and supplemental lesson-related presentations, and resources such as station set-up photos and information. All instructors were required to review the lesson plan and supplemental materials at least a week in advance and request training as needed. Reflections from question four, "What part(s) of your training helped during your instruction? Why?" focused on the parts of training that were helpful to instructors. Nine of the seventeen S.T.A.R. instructors' reflections reported that they did not have in-person hands-on training related to that specific curricular instruction but instead relied on reviewing the lesson plans and PowerPoint slides.

- *"Viewing the slides helped me prepare. It wasn't a very difficult class so practicing on my own was sufficient."*

Of the eight instructors that did attend in-person training, all reported that parts of their in-person training were helpful to/during their instruction. More specifically, instructors found the trainings were helpful because it allowed them to get a preview of the activities ahead of time, ask questions and learn about the equipment.

- *"Training was helpful in that we got to know the activities we were going to do before hand and were able to ask questions in how we could best help the instructor for the most effective class time."*

Of those eight, six reported that reviewing lesson plans and station slideshows and practicing delivery was helpful to reinforce their training and prepare them for instruction.

- *"Going over the slides on my own and having the ability to practice them at home helped me."*

One of the eight responses reported that information regarding the students' content knowledge of the topic and helping create station slideshow content was helpful.

- *"I think knowing what the kids learned in their classes beforehand helped me give them more relevant information that they would know. Also, helping in creating the slides for the class helped me better prepare and know how to present."*

One instructor response reported that it was helpful to have information about the equipment and specimens.

- *"During training I learned what the SEM microscope was and the fossils that would be shown in the lab."*

Overall, regardless of whether an instructor attended an in-person training or not, the majority of S.T.A.R. instructors reported that reviewing the lesson plans and station slideshows allowed them to practice and prepare for the lessons and helped in their overall instructional performance. Additionally, having prior knowledge of the material and information and experience with the equipment and/or specimens was also valuable.

To determine how S.T.A.R instructors impact student learner engagement during curricular experiences, we utilized qualitative data from one S.T.A.R. instructor post-instructional reflection question and two classroom teacher reflections along with the qualitative and quantitative data used to define overall engagement levels assessed during each experience. Utilizing this approach, we found the following:

Hands-On Cross-Age Curricular Experiences Result in High Engagement

Question three of the S.T.A.R instructor post-survey, "Were the students productively engaged? How do you know?" allowed S.T.A.R. instructors to reflect on student engagement and how they determined whether students were productively engaged. Sixteen out of 17 responses reported that students were productively engaged. Fifteen of the responses referenced students answering or asking questions as evidence of productive engagement.

- *"I think the students were very engaged based on how fast they responded to any questions I asked or new slides/specimens."*

Nine responses reported interaction with station specimens and equipment as the indicator of productive engagement.

- *“The students showed engagement by how excited they were. For the most part they were willing to listen and participate in looking through the microscope and choosing specimens to view.”*

Six responses reported active participation in the form of providing observations, ideas, and relevant information as indication of productive engagement.

- *“Yes, they showed engagement by participating in the activities and by being focused in the tasks we gave them.”*

- *“The students were definitely productively engaged, it was very easy to tell just because they were 7th graders and old enough to be engaged with content easily. They weren’t distracted and all of them actively participated.”*

Overall, S.T.A.R. instructors reported that the majority of classes showed productive engagement and stated that they knew students were engaged when they interacted with specimens and equipment, actively participated in activities by sharing their observations, related information, providing ideas, and answered and asked questions.

Supporting reflections:

- *“The students showed engagement by how excited they were. For the most part they were willing to listen and participate in looking through the microscope and choosing specimens to view.”*

- *“Most of them, yes!!! Their shock and surprise when I showed the pictures with bones rather than just toy photographs was such a good indicator that they actually were engaged.”*

- *“Yes. They were very intrigued by the plants I showed them and answered the questions I asked them.”*

Teacher reflections when asked “Were the students engaged during the experience?” and “Were the lab-based activities engaging/effective?” indicated that curricular experiences were extremely effective in keeping students engaged during the experience. When asked how teachers felt about the overall effectiveness of the S.T.A.R instructor instructional performance, all teachers responded that S.T.A.R instructors are effective and engaging throughout the curricular experience. Teachers provided written responses when asked if they felt it was beneficial to have high school students teaching their students and if so, why. All responses were positive.

Supporting reflections:

- *“The students were engaged. I received a few parent emails saying that the students went home excited about the lab.”*

- *“It’s a win for everyone! Teaching the younger students helps both parties.”*

- *"Students, especially high school students, listen best to other students."*

Lastly, 37 curricular experiences were evaluated for student engagement and behavioral/attention issues and defined an overall engagement level (Table 2). Of the 37 experiences, 36 were evaluated as having an overall high student engagement level (Figure 2). One of the experiences was evaluated as having an overall medium student engagement level due to a high level of behavioral/attention issues. Thirty four of the 37 curricular experiences reported no behavioral/attention issues (Figure 3). Two of the experiences were determined to have a medium level of behavioral/attention issues. Overall, curricular experiences, even when medium or high levels of behavioral/attention issues occur, resulted in a medium to high level of overall student engagement.

Figure 2

Count of Overall Student Engagement Levels during all Curricular Experiences

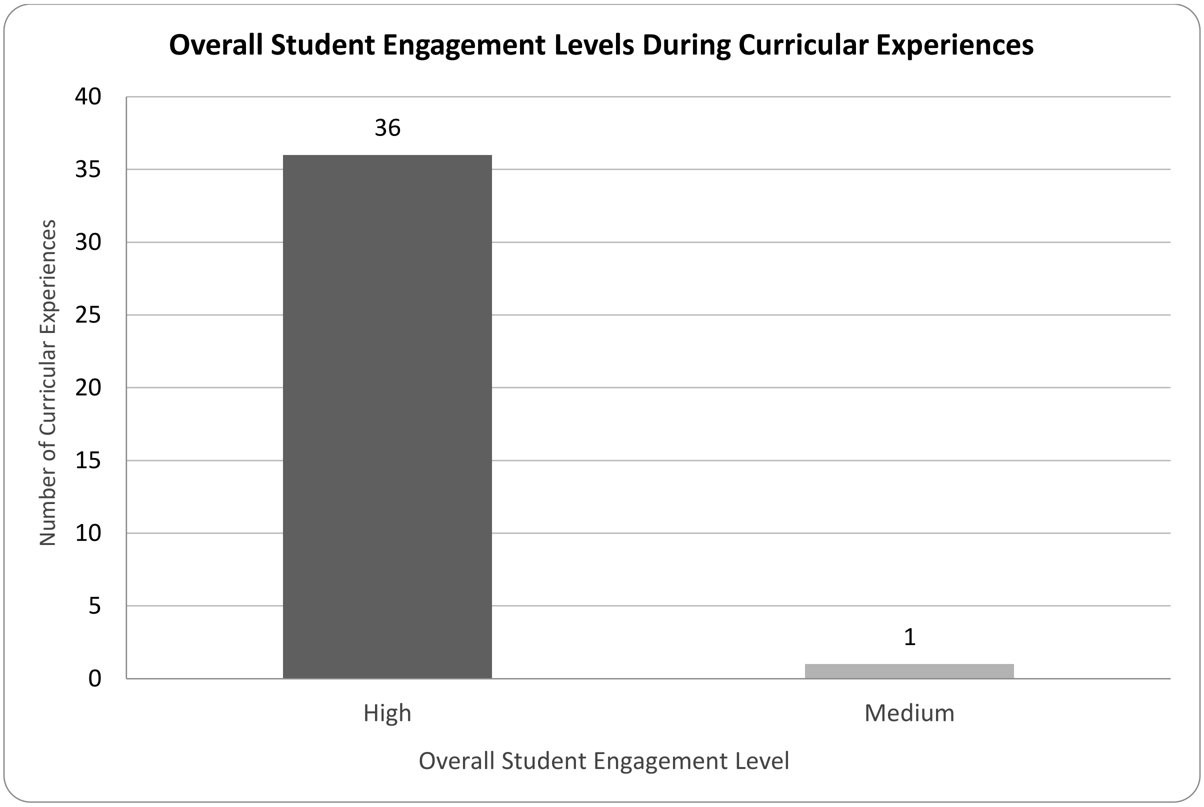
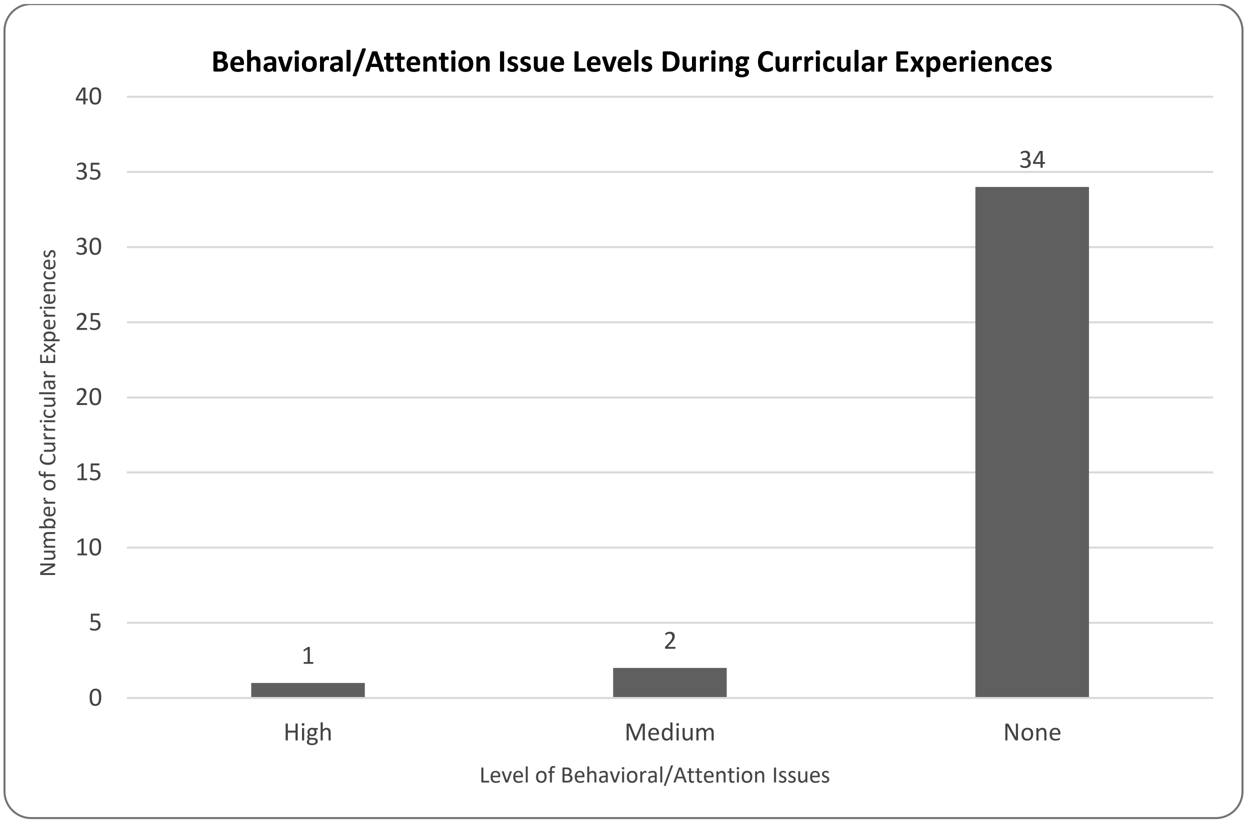


Figure 3

Count of Behavior/Attention Issue Levels during all Curricular Experiences



Discussion

The S.T.A.R program allowed us to engage high school students and expand the number of hands-on scientific learning opportunities from the 2021-2022 to 2022-2023 school year by 45%. Overall, S.T.A.R. instructors reported positive experiences teaching and are able to utilize their training resources to overcome instructional challenges. Overall, S.T.A.R. instructors feel more confident after each teaching experience showing an increase in self-efficacy. Additionally, observations of students during curricular experiences show high levels of student engagement. These observations are confirmed by S.T.A.R instructors who indicate that students show productive engagement throughout curricular experiences. Further confirmation by classroom teachers indicates that S.T.A.R. instructors are effective and engaging. Overall, this data highlights the positive impact that the S.T.A.R. scientific curricular experience program has had on S.T.A.R. instructor self-efficacy and on student engagement.

The program evaluation was limited in scope during our first year, however, we hope to expand on our evaluation. Due to the limited number of student instructors, training was not required but encouraged, as the program grows, we will require training for all new program participants. Requiring training will allow us to execute a more in-depth analysis of training effectiveness and needs. Additionally, we also hope to begin analyzing how the instruction impacts student learning performance by analyzing student assessment data. Our hope is that we can more effectively evaluate the effectiveness of this program to impact student learning with regards to specific standards.

More broadly, these positive findings re-emphasize the importance of cross-age instruction. We hope this research inspires educators in all settings to engage older students in instructional experiences for younger students. Research on cross-age instruction is clear on its benefits for both the student instructor and learner. We encourage educators to increase scientific cross-age instructional experiences and allow their students to share in the enjoyment and wonder of learning science.

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Appendix A

S.T.A.R. Instructor Post-Instruction Questionnaire Questions

1. How do you feel about your instructional performance today?
2. What was your most challenging moment and why?
3. Were the students productively engaged and how did you know?
4. What part(s) of your training helped you during your instruction and why?

Appendix B

Student Post-Instruction Reflection Questions

These questions were asked to the class after each instructional period, whenever possible but were not included in analysis for the current study questions but will be analyzed in future studies.

1. What is the most important thing you learned today and why?
2. What was your favorite part of today's lab visit?
3. Raise your hand if you liked learning from the high school students.
4. Raise your hand if you would like to come back and work on a project in the Owls Imaging Lab.

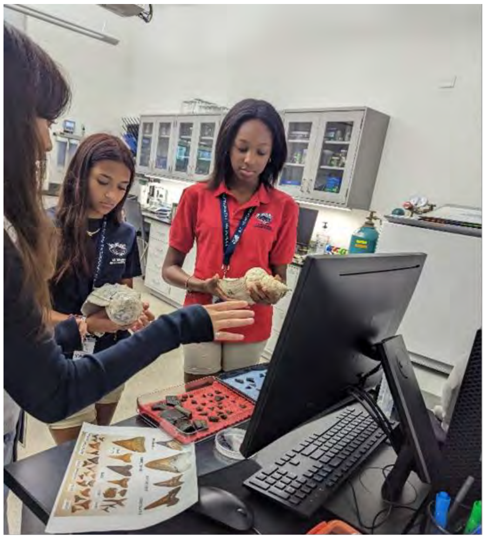
Appendix C

Anonymous Classroom Teacher Reflection Survey

1. Please rate the effectiveness of each of the following components on a scale of not at all effective, somewhat effective, extremely effective or N/A. Indicate N/A if the component was not part of your curricular experience.
   i) Pre-Planning: planning of the visit, including communication, scheduling, preparation by the research team.
   ii) Support of your lessons/instruction: Did the experience support the standards your requested/are teaching?
   iii) Relevance to the lessons/standards: Was the experience relevant to your classroom instruction?
   iv) Classroom-based student activities: Were the classroom-based activities engaging/effective?
   v) Lab-based student activities: Were the lab-based activities engaging/effective?
   vi) Engagement: Were the students engaged during the experience?
   vii) Overall visit: How effective do you feel the experience was as a whole?
2. As part of our research on the effectiveness of cross-age instructional programs, our lab instructors are trained high school students, please let us know how you felt about the overall effectiveness of their instructional performance. One star = least effective/engaging, five stars = most effective/engaging. If the instructors for your activity were staff, please skip this question.
3. Do you feel it was beneficial to have high school students teaching your students? If so, why?
4. Please review your students' performance data when answering this question. Your answers will assist us in accurately assessing how these curricular experiences impact overall student performance.
   i) In reviewing your performance data, do you feel the curricular experiences positively impacted student performance? If so, how?
5. Please provide any additional feedback, i.e., quotes from students/parents or paraprofessionals.

Appendix D

Images of S.T.A.R. Instructors with Students During Various Curricular Experiences




Appendix E

Total Number of Reflections/Observations

S.T.A.R. Instructor Post-Instruction Reflections	Student Engagement Observations	Classroom Teacher - Reflections	**Total Number of Reflections & Observations**
17	37	11	**65**

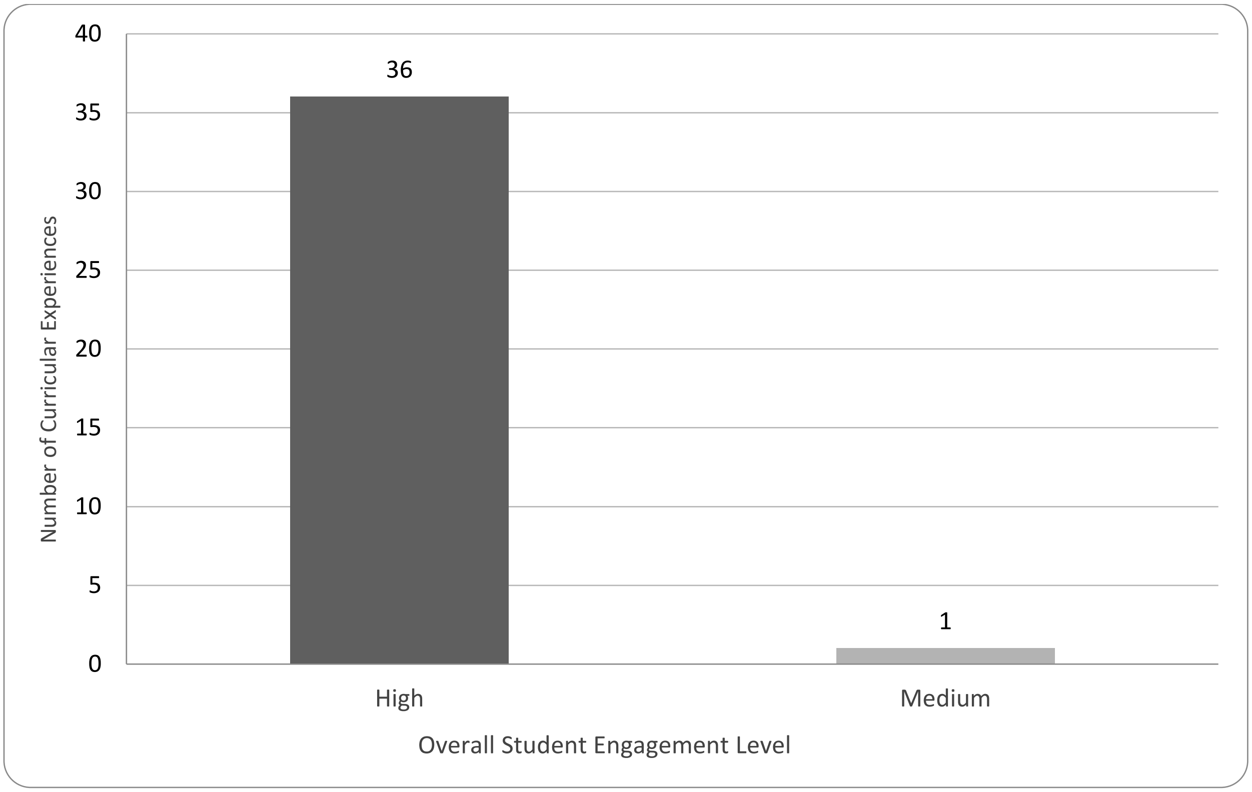
Appendix F

Relationship Between Engagement Level and Behavioral/Attention Issues Observations

Engagement Level – % of students – Amount of Time	Behavioral/Attention Issue Levels	Overall Engagement Level defined as:
High – 0-25% - Very Minimal, only once or twice.	**None - Low –** minimal, brief distractions, students re-engage quickly	**High –** students maintain focus, are productively engaged, and re-engage quickly after minimal disruption
Medium – 25-50% - short periods, happening more than two times	**Low-Medium –** short but multiple distractions, students quickly re-engage	**Medium –** students are distracted multiple times but re-engage quickly after each distraction
Low -50-75% - majority of activity/class, consistent disruptions	**Medium-High –** consistent distractions for longer time periods, students unable to quickly re-engage	**Low –** students are highly distracted, and learning is disrupted, difficult to re-engage after each disruption

Appendix G

Student Engagement Levels During Curricular Experiences



Appendix H

Behavioral/Attention Issue Levels During Curricular Experiences