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ARTICLE

Engaging, Entertaining, and Educating Under-Served and At-Risk Youth with STEM-Based Activities

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In recently constructing a curriculum for our Neuroscience major, a service-learning component was included that requires students to develop and present STEM-based activities to underserved 4th-6th grade children in an afterschool program. Though initially proposed with a primary goal of teaching children specific concepts in the field of neuroscience, efforts have gradually shifted towards simply increasing interest in, and enthusiasm for, STEM through interactive demonstrations. Most of the activities used incorporate neuroscience examples that are inherently intriguing and conceptually accessible to children. The present article briefly summarizes our experiences with enlisting college students as youth mentors, and having those students work within the community to establish a conducive setting for such a program. Insight is also offered into developing activities that might be successful for working with this particular population, including possible approaches to assessing effectiveness. Finally, specific examples for several activities are given.

Key words: service learning, neuroscience program, community service, children, STEM-learning, undergraduate mentors

During recent curriculum development for the Neuroscience (NS) major at SUNY Geneseo, faculty and administrators agreed that such a major would benefit greatly from the addition of courses designed to encourage practical application of educational materials. The obvious choice was to include a practical laboratory course that allows students to gain hands-on experience in animal care, brain extractions, tissue sectioning and staining, and other such skills. The less obvious choice, but deemed equally important and so also included in our curriculum, was a course designed specifically to encourage student engagement in the local community. Frequently referred to as "service-learning", "civic engagement", or "community-based", the benefits of such a course have been well documented for the general curriculum (Fisher et al., 2017; Simons et al., 2011; Yeh, 2010) and more specifically for NS programs (Fox, 2015; Mead and Kennedy, 2012; Yu et al., 2013). For the program at Geneseo, two possible approaches to such a course were approved for the curriculum. The first format is one in which students receive training in how to care for individuals affected by neurological disorders of aging (primarily Alzheimer and Parkinson disease), after which they work within a local respite daycare center. This community service is supplemented by scientific literature research on the disorder affecting the individual(s) with whom the student is working. The second format is one in which students begin by researching the rationale and methods used to present STEM-based information to youths in local school districts. Ideally, the information chosen is neuroscience based. The students then design and present a series of weekly workshops/activities to a select group of local 4th, 5th and 6th grade children with the primary objective of enhancing interest in STEM and in neuroscience education. In both formats, the course culminates with a poster presentation that summarizes the class experience and is presented at GREAT (Geneseo Recognizing Excellence, Achievement & Talent) Day, a college-wide arts, literature and research exhibition (State University of New York at Geneseo, 2018b). The bulletin description for this course is as follows:

> *NEUR 215: Applications in Neuroscience*
> *This course requires students to work in the local community, directly applying their education in neuroscience. Possible applications include working with individuals who are adversely affected by neurological disease/dysfunction, offering STEM-based workshops for local children in afterschool programs, and educating members of the community on current topics related to neuroscience. Students will also compose a written report and poster-style presentation integrating experiences of their field work with relevant findings from current scientific literature. Restricted to Neuroscience majors.*

The inception of our NS program fortuitously coincided with funding approval for an AmeriCorps VISTA program grant entitled *Low Income Elder Care & Family Resource Development*. Submitted by the SUNY Geneseo Office of Student Volunteerism and Community Engagement (OSVCE) (State University of New York at Geneseo, 2018d) in collaboration with the NS program, this grant included a primary objective of providing STEM-based afterschool activities for underserved and at-risk youth in the local community. As such, efforts in the NEUR 215 course have been largely focused on these activities working with children. The present report is a description of how this service-learning course has been designed and adapted over a two-year period. In addition, a compilation of five STEM-based workshops focusing on neuroscience has been included in summary form. Some insights are also offered with regard to outreach presentation methods and relative effectiveness of individual workshop activities.

It should also be noted that while the NS curriculum does not currently require participation in the respite daycare program, some NS students have chosen to volunteer for this service on their own time. This volunteer opportunity has also gained popularity among psychology majors, and students preparing for medical school.

ENLISTING COLLEGE STUDENTS AS EDUCATIONAL MENTORS

For community outreach projects focused on STEM education, local college students represent a readily accessible and highly desirable population from which to recruit mentors. The desirability of using these individuals as mentors comes from their ability to identify with, and relate to, children in their own community. For example, Geneseo NS students working on this particular project have frequently recalled their own early school experiences, including those experiences that they found most interesting and impactful. College students also appear more cognizant, than older program volunteers, of the technological, social, and cultural trends of their younger counterparts. In addition, college student populations typically yield volunteers representing a wide diversity in terms of sex, race, and culture. This diversity is noteworthy when considering that, as mentors, these students assume a role-model position, in even brief encounters such as workshop activities. When promoting STEM, it is particularly important to represent "experts" as a diverse group of individuals, in focused efforts to encourage an equally diverse range of children to seek future opportunities in these areas. Our program has been quite diverse in terms of gender and ethnicity. Approximately half of the NS students are women, and racial and ethnic groups represented have included White, African American, Asian American, Hispanic and Middle Eastern students. Hughes and colleagues (2012) have noted the benefits of mentors being relatable to their mentees in a variety of ways, including actions, attitudes and in some cases gender (e.g., assuming an older sibling role).

In addition to the natural enthusiasm many college students have for working with children, these same students are frequently seeking co-curricular activities to bolster resumes for work, graduate school, and medical school applications (Thompson, 2011). Specifically, Thompson notes that aspirational college students often cite the perceived benefits of simply gaining experience working with children as well as increasing skills and confidence building that come with such experience. Students in our program are cautioned against believing that they can simply cite their participation in community service work (i.e., resume "padding") and that they should be prepared to thoughtfully articulate their experiences. Our students are also encouraged to consider how, if given the opportunity, they might initiate and/or coordinate future community-based activities. Capitalizing on these characteristics that make college students so uniquely suited for this type of community work, the Geneseo NS program has formalized participation through NEUR 215 which is a 2-credit course requirement for the NS major.

It should be noted here, that because our NS program is small (capped at 9 students per graduating class) the requirement of this course for the major is manageable. For larger NS programs, a community-based service-learning course may be better suited for elective status if service opportunities are limited. Because of the small size of our program, the NEUR 215 course offering enrolls 4-5 upper division students each semester. All students who take the course are required to meet together for one hour each week with a faculty member. Meetings include a discussion of goals for the course, and a review of selected readings (e.g., Bruce and Bruce, 2002; Foy et al., 2006; Nature Neuroscience Editorial, 2009). Students also meet each week with the Geneseo AmeriCorps VISTA member for input on expectations related to, and progress toward, the overall design of the project.

After initial meetings and discussions, students are instructed to work as a group, on their own time, to develop engaging, entertaining and educational STEM-based activities that they deem appropriate for children in the age-range of the afterschool program. In our case children range from grades 4-6 (typically ages 9-12). Students are directed to use web-based resources as well as information from scientific literature, including scholarly journal articles and conference presentations that are posted on our website (State University of New York at Geneseo, 2018). While it may be tempting to offer students a well-organized and clearly scripted procedure to follow, it has been our experience that allowing students to "re-invent the wheel" each semester offers several advantages.

1. Allowing students to develop their own activities tends to let them work to their strengths by giving them the choice to use subject matter that they are most comfortable presenting. For example, our premed NS majors enjoyed directing "neurosurgery" demonstrations allowing children to extract objects from a gelatin mold brain. In this activity premed students then engaged children in conversations about careers in medicine, including neurosurgery.
2. Allowing students to work through the process of program and activity development has inherent pedagogical advantages over presenting them with scripted and prepared materials. Most evident in this regard, students must actively research the materials they wish to present. They must then present their proposed activity to the supervising faculty member for constructive feedback, comments, and approval before presenting to the children.
3. Children who attend the afterschool program in successive semesters are less likely to encounter repetition in activity content and/or student presentations. Though a supervising faculty member could directly ensure that activities are not repeated, this approach could stifle production of unique derivations of previously presented concepts (see "candy neuron" vs. "healthy edible neuron" below).

As a starting point, our students are given some initial guidance, including instructions to visit The DANA Foundation web site (The Dana Foundation, 2018). This site has a vast array of resources including publications such as the *Mind Boggling* series that is particularly useful in inspiring our students to develop engaging NS activities. NS students have also drawn heavily from The Neuroscience for Kids website (Chudler, 2018) when searching particularly for simple experiments that can be presented in a small window of time.

WORKING WITH THE COMMUNITY

A STEM education program, such as the one described here, is dependent on a high level of coordination with a college public service office, a local school system, and/or a well-established organization within the community. At Geneseo, the OSVCE has been our focal resource. This office was particularly instrumental in securing the AmeriCorps VISTA program grant that in turn funds an individual who acts as an intermediary between the college and the community. More recently, we have teamed with the Institute for Community Health Promotion (ICHP) at SUNY Buffalo State as a part of their Collaborative Research Initiative (CRI). With the NYS Office of Children and Family Services as one of their sponsors, the ICHP generously offered support for professional development of our program making it possible to formally present our methods and findings here in JUNE and on our evolving web site.

The initial VISTA grant was also cosponsored by St. Michael's Episcopal Church in Geneseo, NY. The Church provided an afterschool meeting place as well as some supplies for workshop activities. This collaboration was made possible with Geneseo Public Schools' offer of bus service to pick up children from the church after the program ended (4:30 P.M.) and deliver them to their usual afterschool drop-off points. Drop-off at the Church immediately after school did not require special arrangements, as this location was included within the original bus route.

After two years of participation, the Church was no longer able to offer space for this program, requiring a change in community partnership. Based in part on the success of the program, the OSVCE and our VISTA member were able to secure support from the SUNY Geneseo School of Education (SOE). Under the new arrangement, SOE students are now hosting the children here on campus, and acting as tutors. For their efforts, those students receive volunteer credit time applied toward their degree program. The SOE is also making an effort to involve students from a range of departments across the college increasing the variety of activities that may be offered to the children. While hosting the program on the college campus still requires special arrangements for transporting children, it is quite convenient for administrative organizers and college student volunteers.

ESTABLISHING A SETTING CONDUCIVE TO ACTIVITIES

As currently run, our STEM activities are one segment of a larger outreach program designed to promote both education and health initiatives, selectively targeting low-income, underserved, and at-risk youths. For our purposes, youths targeted for the program are identified by school counselors. One predominant, but not defining, characteristic is residence in subsidized housing. Though demographic data have not been analyzed, the majority of children in this rural region are White non-Hispanic. In general, this after-school program has been offered three days per week (Tuesday-Thursday) during the school year, from approximately 3:00-4:30 P.M. One function of the program is to provide a safe and healthy environment for children who may otherwise wait alone at home for a working parent. Initially, the program hosted 6-8 children with a capacity to serve about 10. That number has now increased to 10-12 children in our new campus facility, with a capacity to serve about 20.

The typical daily schedule for the program begins with a play/recreation period that is followed by a nutritious snack. The final portion of the program is reserved for engaging social interactions that incorporate arts, education, or health-based activities. Our STEM activities, presented by NS students represent one option for this final portion of the program. Other activities, directed by non-NS students have included touring the local farmer's market, instruction in playing steel drums, and instruction in dance techniques.

When first introduced, we hoped that creatively crafted STEM activities could be engaging, even for children who had just completed a full day of classroom study. To our delight, the NS students have been met with a high degree of enthusiasm during their visits (see *Basic Concepts in Developing Activities* below).

We believe that success in generating enthusiasm among the children for participation in our activities can be credited, in part, to our limited presence. More specifically, our NS students currently lead activities no more than one day per week. In larger communities, where multiple organizations could sponsor programs, STEM education activities could be presented on alternating days, at different locations, maximizing the number of children served as well as increasing opportunities for volunteer participation. Our success may also be credited in part to the energy and excitement exuded by our NS students when interacting with the children. We believe that allowing our NS students to develop novel demonstrations each semester is a crucial factor in creating an atmosphere of excitement and anticipation. In essence, our NS students are often as amused as the children when demonstrations are successful creating a sense of shared awe in the processes of science.

BASIC CONCEPTS IN DEVELOPING ACTIVITIES

Each semester, the students' approach to developing activities has been quite fluid. Students predictably begin with some conceptually ideal approach, wanting to educate children in specific realms of neuroscience. This approach is tempered somewhat by advising these students that the children they will be working with: 1) have not explicitly expressed a particular interest in neuroscience. 2) have just concluded a full school day and may be less-than-enthusiastic about continued learning efforts.

It is worth noting that interacting with children for this program does differ somewhat from our community service activities geared toward older children or children who choose to participate in afterschool science-based activities. For example, when volunteering to assist at local science fairs, the children tend to exhibit greater general understanding of STEM and greater enthusiasm for sharing their knowledge as evidenced by their formal science presentations. With this in mind, NS students in our afterschool program explore more overarching and basic concepts that translate well to a broad scope of STEM-based activities.

To begin, our NS students have found that the types of initial interactions that evoke the best response from children are those that focus on personal introductions from the NS students, some demonstration of general interest (e.g., showing a life size model of the brain), and allowing personal introductions from the children. We have also begun to use this initial interaction to collect some rudimentary data on basic interest levels in science and math, by surveying children regarding their favorite school subjects. In this rudimentary evaluation, science and math have yet to be cited as a favorite by any children in any of our samples. Rather than viewing this finding negatively, we consider that it suggests an ideal baseline for a sample in a program where the primary objective is to increase interest in STEM.

Our NS students have also found that activities should be brief, and include hands-on experiences for the children. For this particular age group, demonstrations that do not include some form of physical activity for the children are least desirable. As such, most of the activities listed in the *Examples of Activities* section below take this finding into consideration.

Finally our NS students generally agree that children seem to respond better to activities staged in the college laboratory than to those presented in the children's normal meeting place. Our first activities hosting children in the laboratory were undertaken with some trepidation, considering the high energy and relatively short attention span they displayed in their usual afterschool meeting place. However, on those initial visits, and all subsequent visits to our laboratory, the NS students have anecdotally reported a general improvement in behavior and attention span among

B	R	A	I	N
Frontal Lobe	Occipital Lobe	Parietal Lobe	Temporal Lobe	Cerebellum
Tumor	Stroke	Alcohol	Concussion	Dementia
Axon	Dendrite	Nucleus	Soma	Myelin
REM	EEG	Dreams	Slow Wave	Hallucination
Humans	Rats	Mice	Monkeys	Dogs

Figure 1. Example of BRAIN game card adapted from BINGO card. NS students read questions and children circle correct response. Questions for rows 1-5 on this card were respectively related to workshops that covered 1) gross anatomy of the brain 2) brain damage/disease 3) neuron anatomy 4) sleep and the brain 5) comparative brain anatomy/function across species.

the children. This was reflected at least in part by an increase in quality and frequency of questions formulated by the children, and their attention to materials being presented.

In our trial-and-error approach, each semester the NS students noted some efforts that they felt were less-than-effective. In general, information presented without a simultaneous physical activity for the children is considered ineffective. This includes presenting video streams, if those streams are not paired with an interactive component. Least well received were any efforts to have children give written answers to questions (i.e., quizzing). In one response to this aversion, NS students superseded traditional quizzing with the brain-bingo game described below and in Figure 1.

ASSESSING "EFFECTIVENESS" OF ACTIVITIES

Initially, we had hoped to assess, and ideally quantify, the effectiveness of our service-learning efforts. However, as the program has evolved we have shifted from efforts to specifically educate children, to efforts more generally directed toward increasing interest and enthusiasm for STEM. This shift was prompted in part by early observations that children did not respond well to being assessed on acquired knowledge (i.e., being quizzed). We further felt that such quizzing might reduce enthusiasm for future participation in activities. In an excellent summary of approaches to assessing STEM activities in children, Jolly (2017) notes a strong personal preference for formative, rather than summative, methods for similar reasons.

With this in mind, we have begun revising our assessment efforts to try to determine relative interest in STEM prior to, and at the conclusion of, each semester that we offer our program. The parameters currently being analyzed include: 1) number of children attending our program for the first time vs. the number of children returning to our program who report science or math as their favorite school subject; 2) number of children who report an interest in pursuing a STEM-based career on the first day of our semester-long program vs. the number that report an interest on the last day of the semester. 3) percentage of students who, at the conclusion of the semester-long program, report enthusiasm for returning to the program in the future.

In addition, our NS students have begun to develop some rudimentary quantifiable testing schemes that may be useful for collecting data on educational value without dampening the children's enthusiasm. In essence, they have tried to test understanding of basic concepts without the children feeling as though they are being tested. To date, the most successful approach has been a bingo-style game (we use "brain" rather than "bingo") played on the last meeting day. For our variation of the game, rather than drawing numbers, the NS students draw clues for basic questions. Children then must mark the correct response on their brain card (Figure 1). NS students can then quantify correct responses based on the children's cards. There are two obvious weaknesses to this form of assessment. First, as with most forms of testing, children may guess a certain number of correct responses. We consider this a minor concern.

Second, and perhaps more problematic, is the lack of a pretest for existing knowledge. Even with the lack of baseline information, we hope to begin gathering some data that might be cautiously considered in future semesters.

ASSESSING IMPACT OF PROGRAM PARTICIPATION ON NS STUDENTS

While the program is still relatively new, some information can be gleaned from precourse and postcourse questionnaires completed by NS students. These questionnaires each contained four quantifiable questions with precourse questions addressing expectations for the upcoming semester, and the postcourse form restating those four questions as reflective evaluations of the concluding course. Each question was rated on a scale from 1 (Absolutely "no") to 10 (Absolutely "yes"). Results from ten students yielded the following data: Pretest #1–"Do you feel that service learning-based courses such as this one can have a significant positive impact on the local community?" (mean=9.0), Posttest #1–"Do you feel that the service learning-based course that you participated in had a significant positive impact on the local community (mean=9.0). Pretest #2–"Do you feel that service learning-based courses such as this one can provide useful experiences that are relevant to your personal career aspirations?" (mean=9.0), Posttest #2–"Do you feel that your participation in this service learning-based course provided useful experiences that are relevant to your career aspirations?" (mean=9.5). Pretest #3–"If a service learning-based course such as this one were an elective, rather than a requirement, for the Neuroscience major would you have enrolled in this course?" (mean=7.67), Posttest #3–"If a service learning-based course such as this one were offered as an elective for other majors, would you recommend that your friends enroll?" (mean=9.25). Pretest #4–"If this service learning-based course was not required for the Neuroscience major, would you have actively sought out an opportunity to apply your education to the local community?" (mean=7.17), Posttest #4–"Do you believe that you may actively seek out future opportunities to apply your education to the local community, as you did in this course?" (mean=8.0). Figure 2 summarizes results using "relative enthusiasm" as a moniker for the data.

The postcourse assessment also includes a space for reflective statements from which to gather general qualitative data. In this section, several students commented that one particularly useful aspect of the course was that it required scientific concepts be studied in greater depth in order to be able to present those concepts on a more simplistic level. Use of the mentoring experience to hone teaching and presentation skills was also noted on multiple forms.

Finally, students worked together each semester to develop a poster-style presentation summarizing their experiences. These posters were presented at SUNY Geneseo's GREAT day where the students fielded questions from faculty and administrators. Posters are also uploaded to the NS web page for public viewing (State University of New York, 2018c).

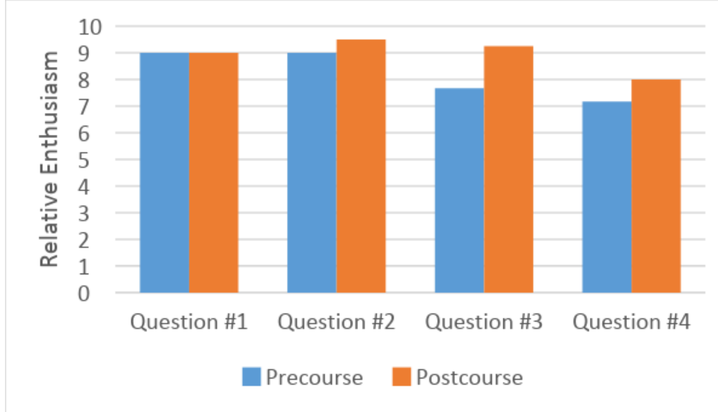

Figure 2. Summary data from precourse and postcourse questionnaire give to NEUR 215 students.

PROMOTING FUTURE COMMUNITY INVOLVEMENT

When first designing the service-learning component of our NS program curriculum, we had intended to approach local elementary and middle school science teachers with an offer to bring a brain-based presentation to their regularly scheduled class. We found this approach was met with some resistance since our local schools appear to be rather entrenched in a standardized curriculum that they must offer students. Perhaps naively, we found resistance to such a proposed enrichment program to be somewhat puzzling. In fact, Whitesell (2016) recently described such "test-based accountability" as a factor in reducing the number of field trips and other enrichment activities offered to children, in favor of more standardized practices designed to raise standardized test scores.

Because of the resistance to our original proposal, to work within an established public school science curriculum, our approach has now shifted. Our revised efforts more specifically target children identified by school counselors as needing additional educational support to keep pace with their peers. In their efforts, our NS students have universally reported great satisfaction working with this population of children. In addition, while the NS students have voiced a desire to present more substantive subject matter at times, the vast majority seem to feel a greater sense of community service working with children who may benefit from a more generalized approach. In this regard, we feel our program has been successful in educating our NS students about the benefits of community activism.

Our program is now entering its third year (the 5th consecutive semester). We believe the relative success of the entire VISTA program, including our portion run by the NS students, has attracted the interest of the community as evidenced by an increase in the number of children being served. Specifically, enrollment for our 4th consecutive semester represents a 100% increase over our first semester (14 vs 7 respectively). Paramount to our success has been evoking positive responses from children by presenting engaging and entertaining activities. We further believe that positive child-to-parent reports have established trust among those parents in allowing their children to continue attending. Subsequent parent-to-parent

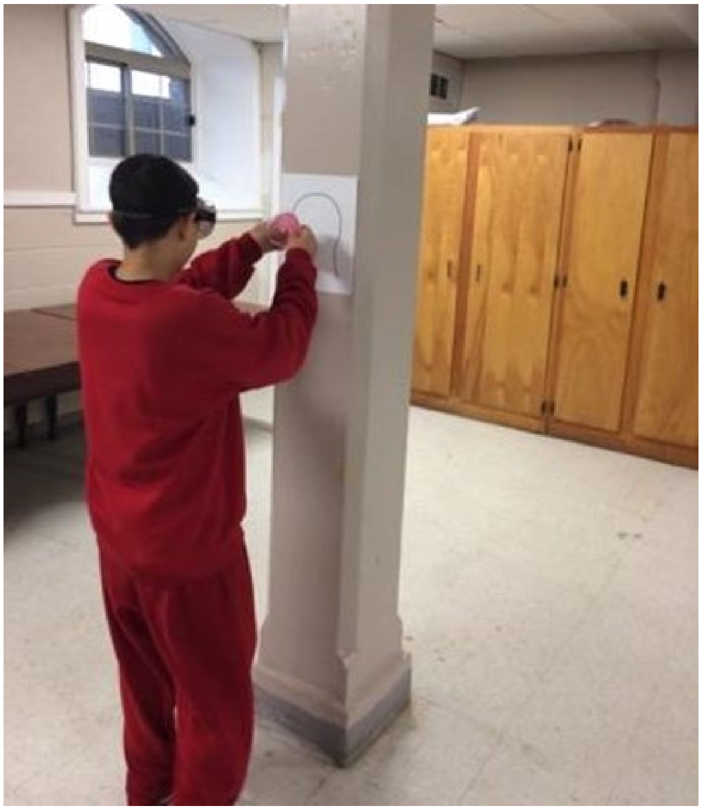

Figure 3. Beer Goggle exercise shows negative effects of drug intoxication using a simple game of pin-the-brain-on-the-skull (à la pin-the-tail-on-the-donkey) while wearing alcohol impairment simulation goggles.

communications may be at least partly responsible for the growing number of children attending our program. Some of the activities that have evoked positive feedback are briefly summarized in the next section. In addition, we are developing a public website where more detailed information will be offered, updated, and linked to other resources including poster presentations summarizing student activities undertaken in each semester of NEUR 215 (State University of New York, 2018c).

EXAMPLES OF ACTIVITIES

Included below are brief descriptions of some of the more successful activities conducted with elementary school-aged children enrolled in our program. Inspiration for these activities has come from a variety of sources available to the public, with the most notable resources being the websites for the Dana Foundation (2018) and Neuroscience for kids (Chudler, 2018). Our laboratory does not claim original development of any of the activities listed below. Rather, these activities are presented with our personal insight into their effectiveness for the purposes of our NEUR 215 course.

Laboratory/Science Building Tour

The physical activity of moving through a laboratory or building lends itself well to young children. This activity also allows children to visualize themselves as college students and as active participants in future scientific pursuits. Such experiences for a population of children who may otherwise have limited exposure to a college environment has the potential to be highly impactful. Our NS students found the tours particularly beneficial when they were combined with scavenger hunts that encouraged children to identify some common items used for scientific research. Expanding the item list to include less obvious and more specific types of scientific equipment offers the opportunity to increase the educational value of the tour.

Basic Brain Anatomy

We have found that this activity is best undertaken using a high quality life-size model of the human brain. Models that can be separated into multiple pieces are best for illustrating structures beyond the cerebral lobes and the cerebellum. As structures are identified, children should be encouraged to engage in activities that utilize those particular regions. For example, auditory, visual and somatosensory stimuli can be presented in association with temporal, occipital and parietal lobes respectively. Having children stand on one foot can be used to demonstrate the role of the cerebellum in balance and so on. Children should be encouraged to physically manipulate the brain model, taking it apart and then reassembling the pieces. References to the children as “scientists” or “brain surgeons” as they manipulate the brain are typically well received.

Beer Goggles

Our NS students obtained a set of alcohol impairment simulation goggles (e.g., 3B Scientific, Tucker, GA) from our campus public safety office. These goggles are typically used for demonstrations with older children, but our NS students found them highly effective for elementary school-aged children as well, as evidenced by their enthusiasm for participation in the activity. Impairment simulation goggles can be used to help explain the role of visual input in maintaining balance and coordination (Figure 3). In addition, children can gain a simple sense of this aspect of

Figure 4. Example of healthy choice edible neuron model using pretzel sticks as dendrites a peach half as a soma in cross section, with the pit representing a nucleus. Celery stalk represents myelin sheath in cross section with peanut butter representing axon and a strawberry as an axon terminal.

performance of coordinated or skilled tasks, such as driving a alcohol impairment, helping them to understand the importance of separating alcohol consumption from vehicle. While raising awareness about the negative effects of drug use may seem premature for elementary school aged children, research has shown that teaching skills in resisting health-compromising influences through the elementary grades can have enduring positive effects in reducing health-risk behaviors (Hawkins et al., 1999).

Edible Neuron

Our students originally developed this activity as the "Candy Neuron" but in subsequent semesters, emphasis was placed on healthy lifestyle/activities for the children, so the neuron evolved to a more nutritious version. As a candy neuron, the structure consists of a marshmallow soma, licorice whip dendrites, jellybean nucleus, and an axon made from SweeTARTS® Ropes. This last item is wrapped in a separate candy outer shell, mimicking the concept of a myelin sheath. In the healthier version, celery stalks are used as the myelin sheath, with peanut butter filling the cavity resembling an axon in cross section. Any fruit containing a single pit can be cut in cross section and used for a soma/nucleus. Pretzel sticks can be inserted into the fruit to represent dendrites (Figure 4). With either method, children should be encouraged to line their individual neurons up in sequence, so that the concepts of transmission and propagation can be explained.

Gelatin Brain

A wide variety of brain molds are commercially available from both scientific equipment vendors as well as novelty item retailers. Each semester our NS students have enjoyed taking a gelatin brain in for the children. As with most of our activities, this one has evolved from its inception as an activity where children would simply eat a flavored gelatin brain, to a more active (and messier) exercise in brain dissection. In its most recent, and most successful, version NS students create a gelatin mold construction favoring durability over palatability using a high concentration of unflavored gelatin and food coloring. Adding to the educational experience, the NS students insert different edible objects (e.g., raisins, grapes) into the gelatin model that represent tumors and stroke damaged regions. Children previously shown the brain model (see *Basic Brain Anatomy* above) can then be asked to identify the particular lobes containing tumors/stroke damage. They can be further prompted to speculate as to what overt behavioral effects might result from each particular tumor/stroke damaged area with respect to location in the brain. Following this demonstration, children can be allowed to extract the objects from the brain using forceps and other surgical instruments, taking on the role of life-saving brain surgeons.

We consider the service-learning aspect of our NEUR 215 course to be successful, yet with potential for much greater future benefits. In terms of immediate success, feedback from NS students regarding their efforts for this class have been highly positive. Results from precourse to postcourse assessment appear to support this contention. In particular, NS students tend to show more enthusiasm for enrolling in a service learning-based course (Question #3) and may be more inclined to participate in social service activities related to their education, (Question #4) after taking this course (Figure 2).

We also feel that the present report in conjunction with development of an informational web site (State University of New York at Geneseo, 2018) will provide guidelines for development of other similar programs. Though highly subjective, reports from the NS students suggest children involved in the program have been positively affected as well.

One immediate future goal is to sustain and grow the program, in an effort to serve even more children in the community. Collaboration with our own SOE is expected to add positive structure including more formal tutoring, particularly in the areas of mathematics and science. Such tutoring could increase the children's confidence in understanding these disciplines. In combination with our brain-based activities we hope to see increased interest in STEM (and NS more specifically) both as desirable subject matter in school and as possible career choices.

Longer term future goals include fostering new programs and collaborations through additional publications and through our web site. Tasking our NS students with developing some quantifiable measures of both interest and knowledge among the children is also a priority. Tangible confirmation of success within a program is a certainly desirable, but more importantly, such data would allow objective measures of the methods being employed.

Finally, and ultimately, we will track our own NS students following graduation to assess their participation in community service. In particular, we hope that experiences at our institution will be used to help shape future programs. Ideally, our students could create and/or enhance similar community service activities in conjunction with their graduate studies.

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